



Postgres Enterprise Manager

Release 7.14

PEM Enterprise Features Guide

Mar 17, 2021

| | | |
|----------|--|-----------|
| 1 | What's New | 2 |
| 2 | The PEM Query Tool | 3 |
| 2.1 | The SQL Editor Panel | 7 |
| 2.2 | The Data Output Panel | 11 |
| 2.2.1 | Data Output Tab | 11 |
| 2.2.2 | Explain Tab | 12 |
| 2.2.3 | Graphical Tab | 13 |
| 2.2.4 | Analysis Tab | 13 |
| 2.2.5 | Statistics Tab | 14 |
| 2.2.6 | Messages Tab | 15 |
| 2.2.7 | Notifications Tab | 17 |
| 2.3 | Query History Panel | 18 |
| 2.4 | Connection Status | 19 |
| 3 | The PEM Schema Diff Tool | 20 |
| 3.1 | The Schema Diff Object Comparison Panel | 22 |
| 3.2 | Schema Diff DDL Comparison Panel | 24 |
| 4 | Performance Monitoring and Management | 26 |
| 4.1 | Using Dashboards to View Performance Information | 28 |
| 4.2 | Managing Custom Dashboards | 31 |
| 4.2.1 | Creating a Custom Dashboard | 32 |
| 4.2.2 | Creating an Ops Dashboard | 36 |
| 4.3 | Using the Manage Charts tab | 37 |
| 4.3.1 | Creating a Custom Chart | 39 |
| 4.3.2 | Importing a Capacity Manager Template | 43 |
| 4.4 | Customizing Probes | 47 |
| 4.4.1 | Creating a Custom Probe | 49 |
| 4.4.2 | Deleting a Probe | 55 |
| 4.4.3 | Copying a Probe | 56 |
| 4.5 | Alerting | 57 |
| 4.5.1 | Using the Alerts Dashboard | 59 |
| 4.5.2 | Using the Manage Alerts Tab | 61 |
| 4.5.3 | Using PEM with Nagios | 81 |
| 5 | Capacity Manager | 88 |

| | | |
|-----------|---|------------|
| 5.1 | Capacity Manager Templates | 92 |
| 6 | Audit Manager | 94 |
| 6.1 | Setting the Advanced Server Instance Service ID | 95 |
| 6.2 | Setting the EDB Audit Configuration Probe | 96 |
| 6.3 | Configuring Audit Logging with the Audit Manager | 97 |
| 6.4 | Viewing the Log with the Audit Log Dashboard | 103 |
| 7 | Log Manager | 105 |
| 7.1 | Reviewing the Server Log Analysis Dashboard | 115 |
| 8 | Postgres Log Analysis Expert | 117 |
| 8.1 | Reviewing the Postgres Log Analysis Expert Report | 123 |
| 9 | SQL Profiling and Analysis | 124 |
| 9.1 | Creating a New SQL Trace | 125 |
| 9.1.1 | Creating a Trace | 125 |
| 9.1.2 | Opening an Existing Trace | 128 |
| 9.1.3 | Filtering a Trace | 129 |
| 9.1.4 | Deleting a Trace | 130 |
| 9.1.5 | Viewing Scheduled Traces | 131 |
| 9.2 | Using the Index Advisor | 132 |
| 10 | Tuning Wizard | 133 |
| 11 | Postgres Expert - Best Practice Enforcement | 140 |
| 11.1 | Using the Postgres Expert Wizard | 141 |
| 11.2 | Reviewing Postgres Expert Recommendations | 144 |
| 12 | Reports | 146 |
| 12.1 | System Configuration Report | 147 |
| 12.2 | Core Usage Report | 150 |
| 13 | Monitoring Failover Manager | 151 |
| 13.1 | Replacing a Master Node | 153 |
| 14 | Monitoring an xDB Replication Cluster | 154 |
| 15 | Performance Diagnostics | 156 |
| 16 | Reference | 162 |
| 16.1 | PEM Server Configuration Parameters - Reference | 162 |
| 16.2 | Capacity Manager Metrics - Reference | 171 |
| 16.3 | PEM Probes – Reference | 174 |
| 16.4 | PEM Pre-defined Alert Templates – Reference | 179 |
| 16.4.1 | Templates applicable on Agent | 179 |
| 16.4.2 | Templates applicable on Server | 180 |
| 16.4.3 | Templates applicable on Database | 183 |
| 16.4.4 | Templates applicable on Schema | 185 |
| 16.4.5 | Templates applicable on Table | 186 |
| 16.4.6 | Global Templates | 187 |
| 17 | Conclusion | 188 |
| | Index | 190 |

This guide will acquaint you with the tools and wizards that are built into the Postgres Enterprise Manager™ (PEM) web interface that make it easier for you to monitor and manage your system.

This guide is not a comprehensive resource; rather, it is meant to serve as an aid to help you evaluate the tool and bring you up to speed with the basics of how to use the product. For more detailed information about using PEM's functionality, please see the online help made available by the PEM client.

This document uses *Postgres* to mean either the PostgreSQL or EDB Postgres Advanced Server database.

The following features have been added to create Postgres Enterprise Manager 7.14:

- **Search Object Functionality:** This functionality helps you to search a database object (schema, index, table, etc.) within a database using a text string and wildcard, and locate them in the browser tree.
- **SMTP emails and SNMP traps:** Newer versions of PEM Agents will be able to send SMTP emails and SNMP traps using multiple PEM Agents simultaneously. The users will get the notification even when the PEM Agent on PEM Server is down.
- **Unmanaged state on Monitoring dashboard:** The database servers registered with PEM for administration only are not bound to any PEM Agent. Those servers state will be as `Unmanaged` on the monitoring dashboard instead of `Unknown` as previously displayed.
- **The 4096-bit key for generating the SSL certificates:** The PEM configuration script, installer, and PEM Agent are modified to generate certificates using the 4096-bit key to improve security.
- **Certificates are now using the SHA256 algorithm (sslutils v1.3):** Signing certificate algorithm is changed to SHA256 from SHA1 to improve security.
- **Other features and changes include:**
 - Enhancements to the Schema Diff tool (Beta) by adding support to Packages, Sequences, Synonyms, Domain, Domain Constraints, Collation, FTS Configuration, FTS Dictionary, FTS Parser, FTS Template, Foreign Tables
 - Improved the accessibility support in different third party libraries
 - Added support for RHEL / CentOS 8
 - Added support for Python 3.8
 - Added support for parameter `toast_tuple_target` and `parallel_workers` of the table
 - Added the ability to warn the user if an unsupported, deprecated or unknown browser is detected
 - Introduced a new v3 version of REST API, which includes SNMP v3 support
 - Removed Features - The Package Deployment wizard and Streaming Replication Wizard are no longer available

The PEM Query Tool

PEM contains a feature-rich Interactive Development Environment (IDE) that allows you to issue ad-hoc SQL queries against Postgres servers.

You can access the Query Tool via the *Query Tool* menu option on the *Tools* menu, or through the context menu of select nodes of the Browser tree control. The Query Tool allows you to:

- Issue ad-hoc SQL queries.
- Execute arbitrary SQL commands.
- Edit the result set of a SELECT query if it is *updatable*.
- Displays current connection and transaction status as configured by the user.
- Save the data displayed in the output panel to a CSV file.
- Review the execution plan of a SQL statement in either a text, a graphical format or a table format (similar to <https://explain.depesz.com>).
- View analytical information about a SQL statement.

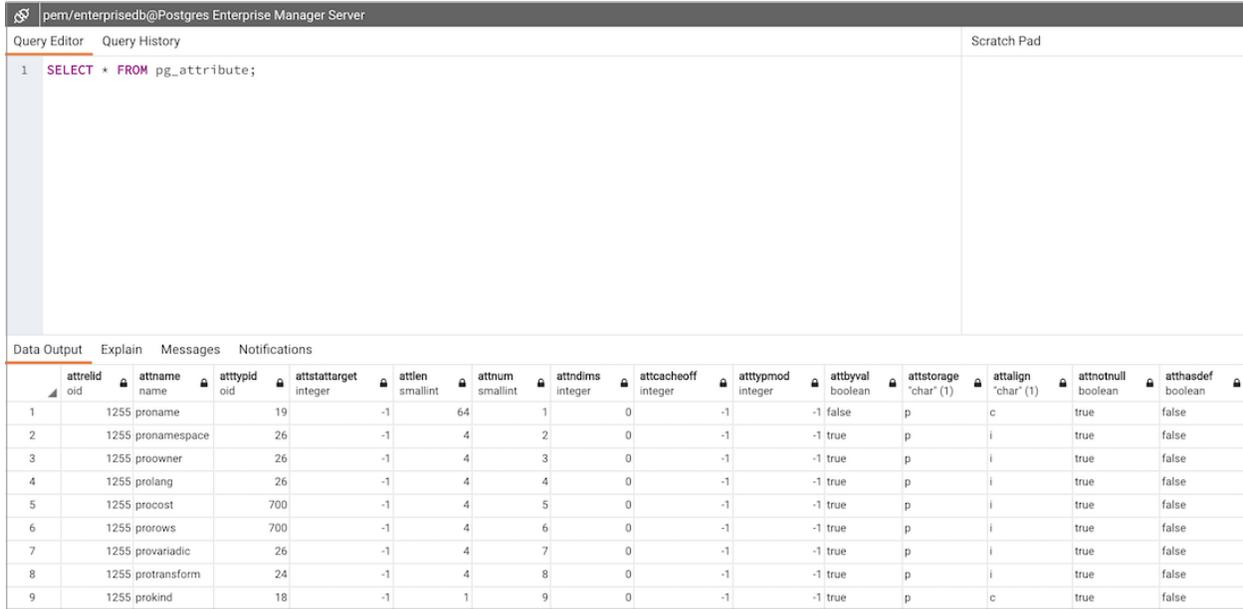


Fig. 1: Query Tool tab

You can open multiple copies of the Query tool in individual tabs simultaneously. To close a copy of the Query tool, click the *X* in the upper-right hand corner of the tab bar.

The Query Tool features two panels:

- The upper panel displays the *SQL Editor*. You can use the panel to enter, edit, or execute a query. It also shows the *History* tab which can be used to view the queries that have been executed in the session, and a *Scratch Pad* which can be used to hold text snippets during editing. If the Scratch Pad is closed, it can be re-opened (or additional ones opened) by right-clicking in the SQL Editor and other panels and adding a new panel.
- The lower panel displays the *Data Output* panel. The tabbed panel displays the result set returned by a query, information about a query's execution plan, server messages related to the query's execution and any asynchronous notifications received from the server.

The Query Tool Toolbar

The *Query Tool* toolbar uses context-sensitive icons that provide shortcuts to frequently performed tasks. If an icon is highlighted, the option is enabled; if the icon is grayed-out, the task is disabled.



Fig. 2: Query Tool Toolbar

Hover over an icon to display a tool-tip that describes the icon's functionality:

| Icon | Behavior | Shortcut |
|------------------|--|---------------|
| <i>Open File</i> | Click the <i>Open File</i> icon to display a previously saved query in the SQL Editor. | Accesskey + O |

continues on next page

Table 1 – continued from previous page

| Icon | Behavior | Shortcut |
|--------------------------|--|---|
| <i>Save</i> | Click the <i>Save</i> icon to perform a quick-save of a previously saved query, or to access the <i>Save</i> menu: <ul style="list-style-type: none"> • Select <i>Save</i> to save the selected content of the SQL Editor panel in a file. • Select <i>Save As</i> to open a new browser dialog and specify a new location to which to save the selected content of the SQL Editor panel. | Accesskey + S |
| <i>Save Data Changes</i> | Click the <i>Save Data Changes</i> icon to save the data changes (insert, update, or delete) in the Data Output Panel to the server. | F6 |
| <i>Find</i> | Use the <i>Find</i> menu to search, replace, or navigate the code displayed in the SQL Editor: <ul style="list-style-type: none"> • Select <i>Find</i> to provide a search target, and search the SQL Editor contents. • Select <i>Find next</i> to locate the next occurrence of the search target. • Select <i>Find previous</i> to move to the last occurrence of the search target. • Select <i>Persistent find</i> to identify all occurrences of the search target within the editor. • Select <i>Replace</i> to locate and replace (with prompting) individual occurrences of the target. • Select <i>Replace all</i> to locate and replace all occurrences of the target within the editor. • Select <i>Jump</i> to navigate to the next occurrence of the search target. | Cmd+F Cmd+G Cmd+Shift+G Cmd+Shift+F Alt+G |
| <i>Copy</i> | Click the <i>Copy</i> icon to copy the content that is currently highlighted in the Data Output panel. when in View/Edit data mode. | Accesskey + C |
| <i>Paste</i> | Click the <i>Paste</i> icon to paste a previously row into a new row when in View/Edit data mode. | Accesskey + P |
| <i>Delete</i> | Click the <i>Delete</i> icon to mark the selected rows for deletion. These marked rows get deleted when you click the <i>Save Data Changes</i> icon. | Accesskey + D |
| <i>Edit</i> | Use options on the <i>Edit</i> menu to access text editing tools; the options operate on the text displayed in the SQL Editor panel when in Query Tool mode: <ul style="list-style-type: none"> • Select <i>Indent Selection</i> to indent the currently selected text. • Select <i>Unindent Selection</i> to remove indentation from the currently selected text. • Select <i>Inline Comment Selection</i> to enclose any lines that contain the selection in SQL style comment notation. • Select <i>Inline Uncomment Selection</i> to remove SQL style comment notation from the selected line. • Select <i>Block Comment</i> to enclose all lines that contain the selection in C style comment notation. This option acts as a toggle. | Tab Shift+Tab Cmd+/ Cmd+. Shift+Cmd+/ |

continues on next page

Table 1 – continued from previous page

| Icon | Behavior | Shortcut |
|------------------------|---|---------------|
| <i>Filter</i> | Click the <i>Filter</i> icon to set filtering and sorting criteria for the data when in View/Edit data mode. Click the down arrow to access other filtering and sorting options: <ul style="list-style-type: none"> • Click <i>Sort/Filter</i> to open the sorting and filtering dialogue. • Click <i>Filter by Selection</i> to show only the rows containing the values in the selected cells. • Click <i>Exclude by Selection</i> to show only the rows that do not contain the values in the selected cells. • Click <i>Remove Sort/Filter</i> to remove any previously selected sort or filtering options. | Accesskey + F |
| Limit Selector | Select a value in the <i>Limit Selector</i> to limit the size of the dataset to a number of rows. | Accesskey + R |
| <i>Stop</i> | Click the <i>Stop</i> icon to cancel the execution of the currently running query. | Accesskey + Q |
| <i>Execute/Refresh</i> | Click the <i>Execute/Refresh</i> icon to either execute or refresh the query highlighted in the SQL editor panel. Click the down arrow to access other execution options: <ul style="list-style-type: none"> • Add a check next to <i>Auto-Rollback</i> to instruct the server to automatically roll back a transaction if an error occurs during the transaction. • Add a check next to <i>Auto-Commit</i> to instruct the server to automatically commit each transaction. Any changes made by the transaction will be visible to others, and durable in the event of a crash. | F5 |
| <i>Explain</i> | Click the <i>Explain</i> icon to view an explanation plan for the current query. The result of EXPLAIN is displayed graphically on the <i>Explain</i> tab of the output panel, and in text form on the <i>Data Output</i> tab. | F7 |
| <i>Explain analyze</i> | Click the <i>Explain analyze</i> icon to invoke an EXPLAIN ANALYZE command on the current query. Navigate through the <i>Explain Options</i> menu to select options for the EXPLAIN command: <ul style="list-style-type: none"> • Select <i>Verbose</i> to display additional information regarding the query plan. • Select <i>Costs</i> to include information on the estimated startup and total cost of each plan node, as well as the estimated number of rows and the estimated width of each row. • Select <i>Buffers</i> to include information on buffer usage. • Select <i>Timing</i> to include information about the startup time and the amount of time spent in each node of the query. • Select <i>Summary</i> to include the summary information about the query plan. | Shift+F7 |
| <i>Commit</i> | Click the <i>Commit</i> icon to commit the transaction. | Shift+CTRL+M |
| <i>Rollback</i> | Click the <i>Rollback</i> icon to rollback the transaction. | Shift+CTRL+R |
| <i>Clear</i> | Use options on the <i>Clear</i> drop-down menu to erase display contents: <ul style="list-style-type: none"> • Select <i>Clear Query Window</i> to erase the content of the SQL Editor panel. • Select <i>Clear History</i> to erase the content of the <i>History</i> tab. | Accesskey + L |
| <i>Download as CSV</i> | Click the <i>Download as CSV</i> icon to download the result set of the current query to a comma-separated list. You can specify the CSV settings through <i>Preferences -> SQL Editor -> CSV output</i> dialogue. | F8 |

2.1 The SQL Editor Panel

The *SQL editor* panel is a workspace where you can manually provide a query, copy a query from another source, or read a query from a file. The SQL editor features syntax coloring and auto-completion.

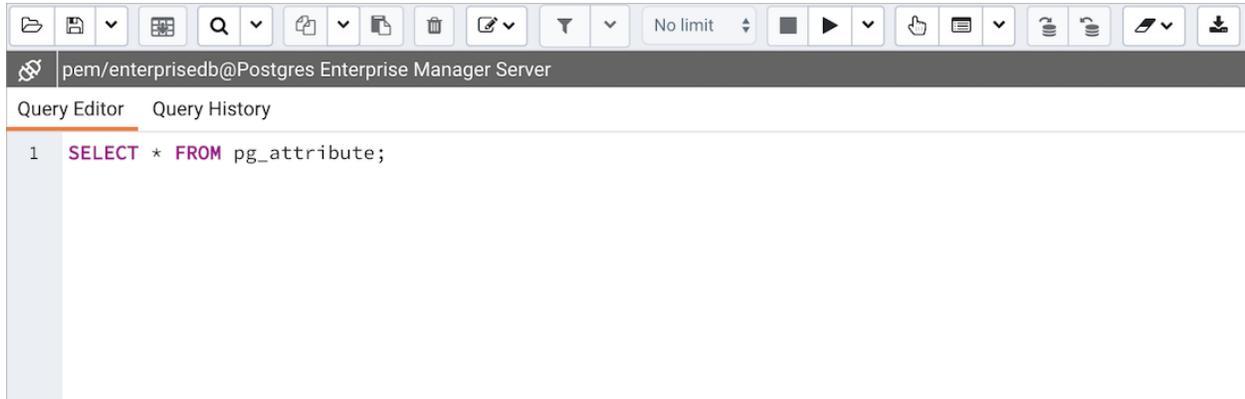


Fig. 3: *Query Tool - Query Editor tab*

To use auto-complete, begin typing your query; when you would like the Query editor to suggest object names or commands that might be next in your query, press the Control+Space key combination. For example, type “*SELECT * FROM* ” (without quotes, but with a trailing space), and then press the Control+Space key combination to select from a popup menu of auto-complete options.

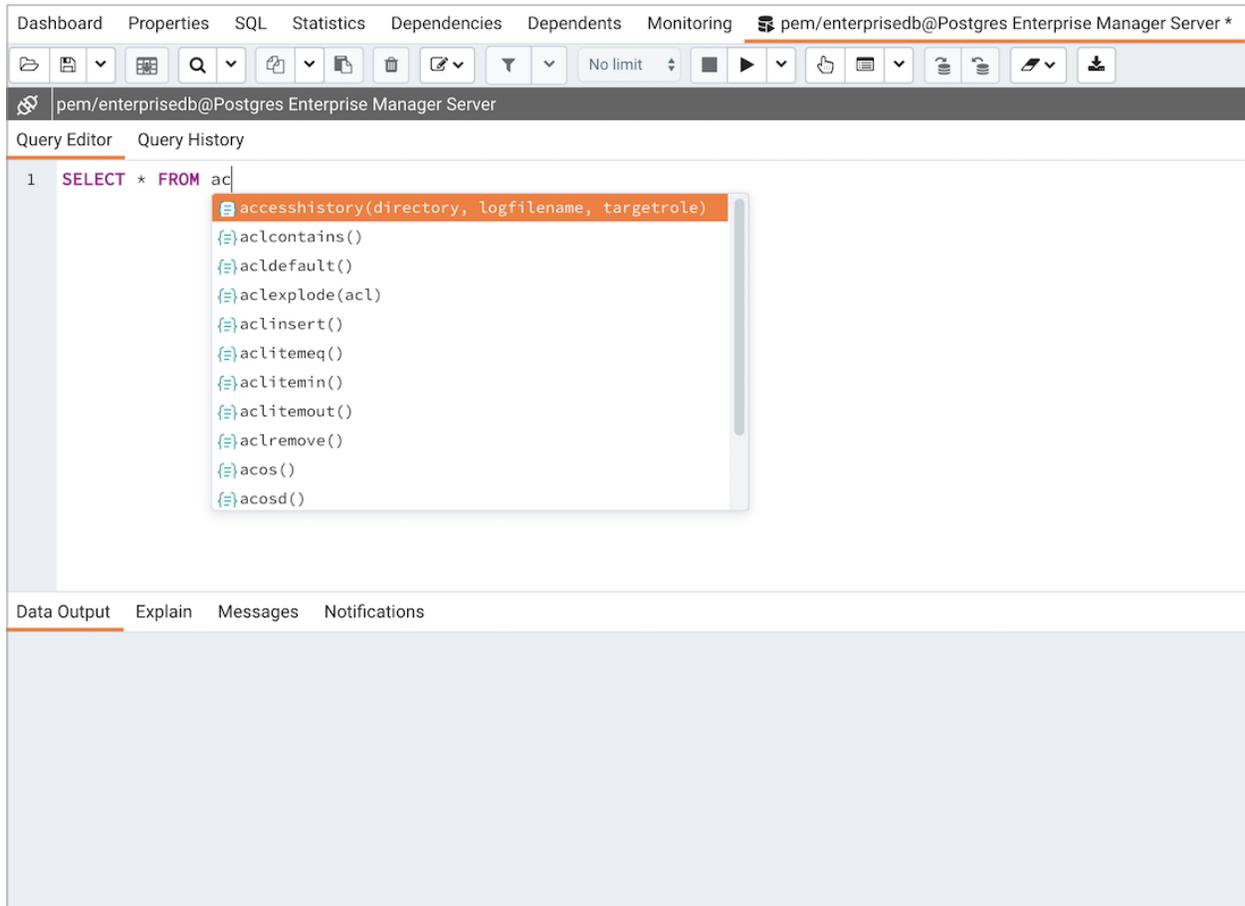


Fig. 4: Query Tool - Query Editor tab

After entering a query, select the *Execute/Refresh* icon from the toolbar. The complete contents of the SQL editor panel will be sent to the database server for execution. To execute only a section of the code that is displayed in the SQL editor, highlight the text that you want the server to execute, and click the *Execute/Refresh* icon.

The screenshot shows the Query Editor interface with three SQL queries. The second query is highlighted, and the Data Output tab is active, displaying a table with 15 rows of 'JOHNY'.

```

1 SELECT generate_series(1,1000) AS ID, 'JACK' AS NAME
2 SELECT generate_series(1,1000) AS ID, 'JOHNY' AS NAME
3 SELECT generate_series(1,1000) AS ID, 'JILL' AS NAME

```

| | id integer | name text |
|----|---------------|--------------|
| 1 | 1 | JOHNY |
| 2 | 2 | JOHNY |
| 3 | 3 | JOHNY |
| 4 | 4 | JOHNY |
| 5 | 5 | JOHNY |
| 6 | 6 | JOHNY |
| 7 | 7 | JOHNY |
| 8 | 8 | JOHNY |
| 9 | 9 | JOHNY |
| 10 | 10 | JOHNY |
| 11 | 11 | JOHNY |
| 12 | 12 | JOHNY |
| 13 | 13 | JOHNY |
| 14 | 14 | JOHNY |
| 15 | 15 | JOHNY |

Fig. 5: *Query Tool - Query Editor tab - Autocomplete feature*

The message returned by the server when a command executes is displayed on the *Messages* tab. If the command is successful, the *Messages* tab displays execution details.

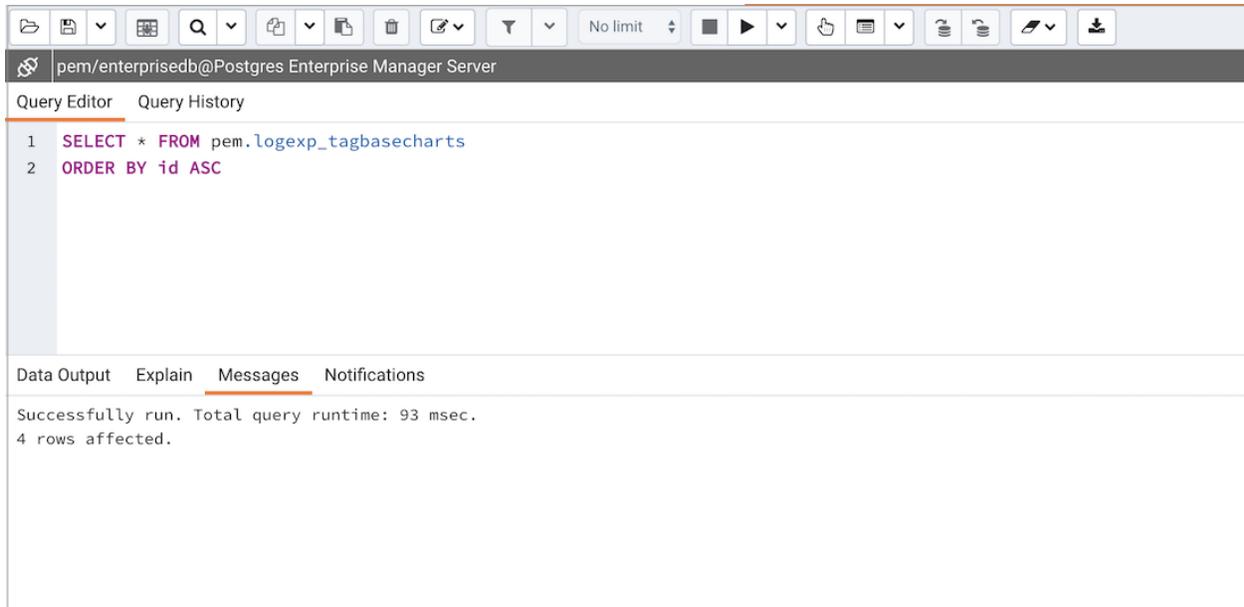


Fig. 6: *Query Tool - Query Editor - Message tab*

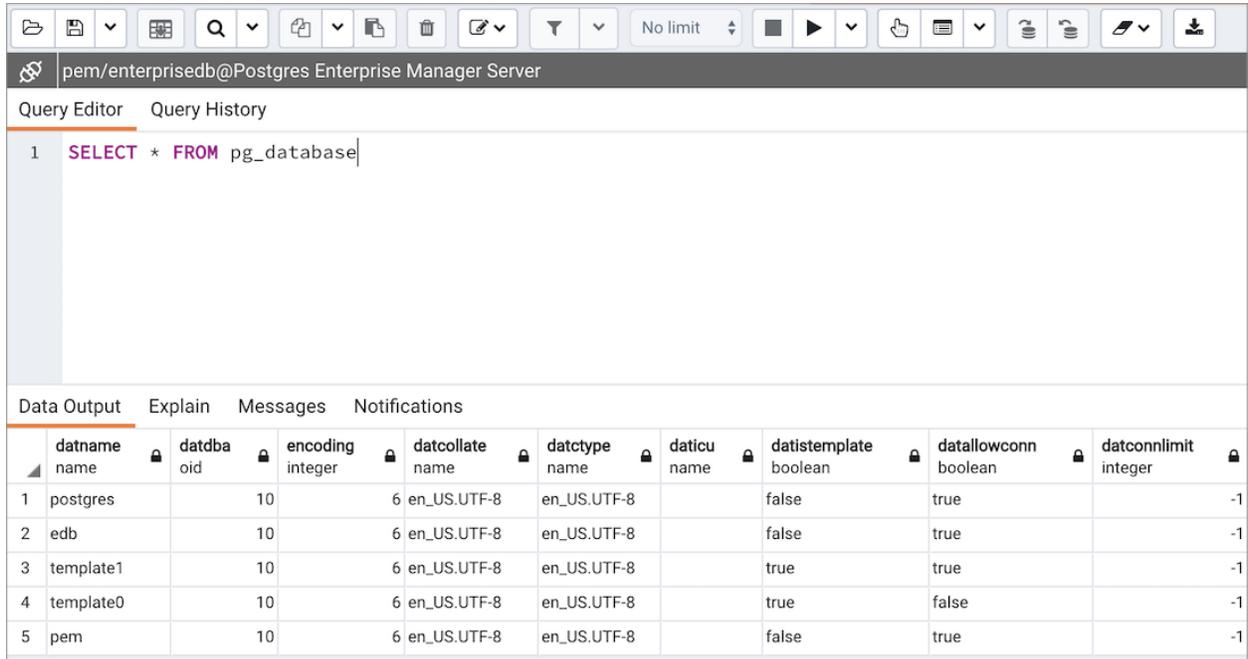
Options on the *Edit* menu offer functionality that helps with code formatting and commenting:

- The auto-indent feature will automatically indent text to the same depth as the previous line when you press the Return key.
- Block indent text by selecting two or more lines and pressing the Tab key.
- Implement or remove SQL style or toggle C style comment notation within your code.

You can also **drag and drop** certain objects from the tree-view which can save time in typing long object names. Text containing the object name will be fully qualified with schema. Double quotes will be added if required. For functions and procedures, the function name along with parameter names will be pasted in the Query Tool.

2.2 The Data Output Panel

The *Data Output* panel displays data and statistics generated by the most recently executed query.



| | datname | datdba | encoding | datcollate | datatype | daticu | datistemplate | datallowconn | datconllimit |
|---|-----------|--------|----------|-------------|-------------|--------|---------------|--------------|--------------|
| | name | oid | integer | name | name | name | boolean | boolean | integer |
| 1 | postgres | 10 | 6 | en_US.UTF-8 | en_US.UTF-8 | | false | true | -1 |
| 2 | edb | 10 | 6 | en_US.UTF-8 | en_US.UTF-8 | | false | true | -1 |
| 3 | template1 | 10 | 6 | en_US.UTF-8 | en_US.UTF-8 | | true | true | -1 |
| 4 | template0 | 10 | 6 | en_US.UTF-8 | en_US.UTF-8 | | true | false | -1 |
| 5 | pem | 10 | 6 | en_US.UTF-8 | en_US.UTF-8 | | false | true | -1 |

Fig. 7: Query Tool - Data output tab

2.2.1 Data Output Tab

The *Data Output* tab displays the result set of the query in a table format. You can:

- Select and copy from the displayed result set.
- Use the *Execute/Refresh* options to retrieve query execution information and set query execution options.
- Use the *Download as CSV* icon to download the content of the *Data Output* tab as a comma-delimited file.
- Edit the data in the result set of a SELECT query if it is updatable.

A result set is updatable if:

- All columns are either selected directly from a single table, or they are not actually a table column (e.g. concatenation of 2 columns). Only columns that are selected directly from the table are editable, other columns are read-only.
- All the primary key columns or OIDs of the table are selected in the result set.

Any columns that are renamed or selected more than once are also read-only.

Note: To work with an updatable query result set, you must have `psycopg2` driver version 2.8 or above installed.

Editable and read-only columns are identified using pencil and lock icons (respectively) in the column headers.

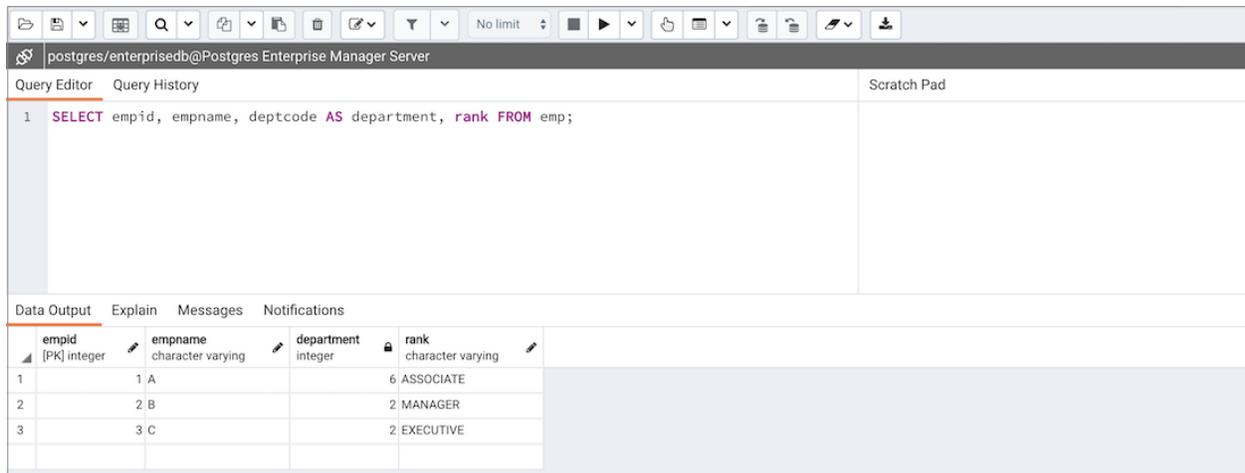


Fig. 8: Query Tool - Editable and Read-only columns

An updatable result set is similar to the Data Grid in View/Edit Data mode, and can be modified in the same way.

If Auto-commit is off, the data changes are made as part of the ongoing transaction, if no transaction is ongoing a new one is initiated. The data changes are not committed to the database unless the transaction is committed.

If any errors occur during saving (for example, trying to save NULL into a column with NOT NULL constraint) the data changes are rolled back to an automatically created SAVEPOINT to ensure any previously executed queries in the ongoing transaction are not rolled back.

All rowsets from previous queries or commands that are displayed in the *Data Output* panel will be discarded when you invoke another query; open another query tool browser tab to keep your previous results available.

2.2.2 Explain Tab

To generate the *Explain* or *Explain Analyze* plan of a query, click on *Explain* or *Explain Analyze* button in the toolbar.

More options related to *Explain* and *Explain Analyze* can be selected from the drop down on the right side of *Explain Analyze* button in the toolbar.

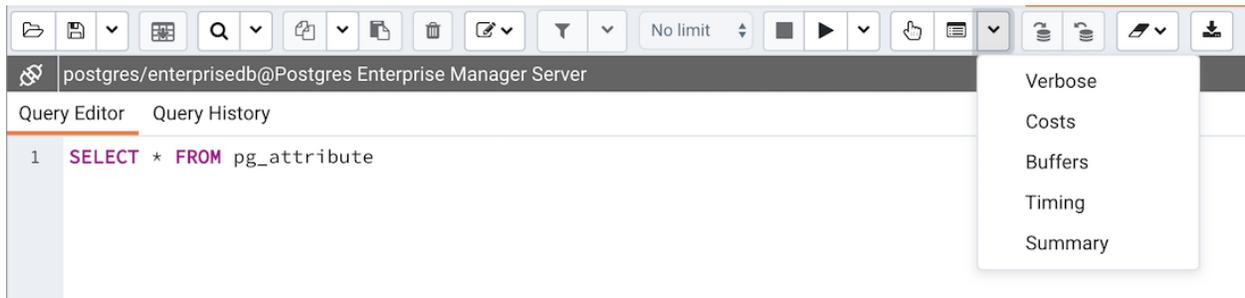


Fig. 9: Query Tool - Toolbar Explain button

Please note that PEM generates the *Explain [Analyze]* plan in JSON format.

On successful generation of *Explain* plan, it will create three tabs/panels under the Explain panel.

100 times → Orange (between Red and Yellow) color

1000 times → Red color

Query Editor Query History

```

41 LEFT JOIN pg_attrdef ad ON ad.adrelid=att.attrelid AND ad.adnum=att.attnum
42 LEFT JOIN pg_foreign_server fs ON fs.oid=dep.refobjid
43 LEFT JOIN pg_foreign_data_wrapper fdw ON fdw.oid=dep.refobjid
44 LEFT JOIN pg_type prtyp ON prtyp.oid = pr.prortype
45 LEFT JOIN pg_inherits inhits ON (inhits.inhrelid=dep.refobjid)
46 LEFT JOIN pg_inherits inhed ON (inhed.inhparent=dep.refobjid)
47 WHERE
48 refclassid IN ( SELECT oid FROM pg_class WHERE relname IN
49 ('pg_class', 'pg_constraint', 'pg_conversion', 'pg_language', 'pg_proc', 'pg_rewrite', 'pg_namespace',
50 'pg_trigger', 'pg_type', 'pg_attrdef', 'pg_event_trigger', 'pg_foreign_server', 'pg_foreign_data_wrapper'))
51 ORDER BY refclassid, cl.relkind
    
```

Data Output Explain Messages Notifications

Graphical Analysis Statistics

| # | Node | Timings | | Rows | | | |
|----|---|-----------|-----------|---------|--------|-------|-------|
| | | Exclusive | Inclusive | Rows X | Actual | Plan | Loops |
| 1. | → Unique (cost=2460.14..2467.34 rows=240 width=587) (actual=80.077..83.053 rows=4545 loops=1) | 2.534 ms | 83.053 ms | ↓ 18.94 | 4545 | 240 | 1 |
| 2. | → Sort (cost=2460.14..2460.74 rows=240 width=587) (actual=80.075..80.519 rows=7989 loops=1) | 16.82 ms | 80.519 ms | ↓ 33.29 | 7989 | 240 | 1 |
| 3. | → Nested Loop Left Join (cost=1885.47..2450.65 rows=240 width=587) (actual=27.682..63.7 rows=7989 loops=1) | 7.598 ms | 63.7 ms | ↓ 33.29 | 7989 | 240 | 1 |
| 4. | → Hash Inner Join (cost=1885.32..2338.65 rows=240 width=1572) (actual=27.663..56.103 rows=7989 loops=1) Hash Cond: (dep.refclassid = pg_class.oid) | 2.948 ms | 56.103 ms | ↓ 33.29 | 7989 | 240 | 1 |
| 5. | → Hash Left Join (cost=1853.2..2278.69 rows=10527 width=1572) (actual=27.516..53.016 rows=10553 loops=1) Hash Cond: (pr.prortype = prtyp.oid) | 3.117 ms | 53.016 ms | ↓ 1.01 | 10553 | 10527 | 1 |
| 6. | → Hash Left Join (cost=1819.59..2217.3 rows=10527 width=1512) (actual=27.29..49.685 rows=10553 loops=1) Hash Cond: (dep.refobjid = fs.oid) | 2.888 ms | 49.685 ms | ↓ 1.01 | 10553 | 10527 | 1 |

Fig. 11: Query Tool - Explain tab - Analysis tab

2.2.5 Statistics Tab

The *Statistics* tab displays information in two tables:

- `Statistics per Node Type` tells you how many times each node type was referenced.
- `Statistics per Table` tells you how many times each table was referenced by the query.

The screenshot shows the Query Tool interface with the following components:

- Query Editor:** Contains a complex SQL query with 11 lines, including various `WHEN` clauses and `COALESCE` functions.
- Navigation Tabs:** Data Output, Explain, Messages, Notifications.
- Statistics Tab:**
 - Statistics per Node Type:**

| Node type | Count | Time spent | % of query |
|-----------------------|-------|------------|------------|
| Hash | 16 | 1.766 ms | 2.13% |
| Hash Inner Join | 1 | 2.948 ms | 3.55% |
| Hash Left Join | 14 | 26.512 ms | 31.93% |
| Hash Right Join | 1 | 0.053 ms | 0.07% |
| Index Only Scan | 1 | 0 ms | 0% |
| Index Scan | 1 | 0.007 ms | 0.01% |
| Materialize | 1 | 0.002 ms | 0.01% |
| Merge Left Join | 6 | 15.643 ms | 18.84% |
| Nested Loop Left Join | 1 | 7.598 ms | 9.15% |
 - Statistics per Table:**

| Table name | Scan count | Total time | % of query |
|--------------------------|--------------|---------------------|-------------------|
| Node type | Count | Sum of times | % of table |
| pg_catalog.pg_attrdef | 1 | 0.007 ms | 0.01% |
| Seq Scan | 1 | 0.007 ms | 100% |
| pg_catalog.pg_attribute | 1 | 0.729 ms | 0.88% |
| Seq Scan | 1 | 0.729 ms | 100% |
| pg_catalog.pg_class | 4 | 0.404 ms | 0.49% |
| Seq Scan | 4 | 0.404 ms | 100% |
| pg_catalog.pg_constraint | 1 | 0.005 ms | 0.01% |

Fig. 12: Query Tool - Explain plan tab - Statistics tab

2.2.6 Messages Tab

Use the *Messages* tab to view information about the most recently executed query:

The screenshot shows the Query Tool interface with the following components:

- Query Editor:** Contains the query `SELECT * FROM pg.roles`, which is underlined in red.
- Navigation Tabs:** Data Output, Explain, Messages, Notifications.
- Messages Tab:** Displays an error message:


```
ERROR: relation "pg.roles" does not exist
LINE 1: SELECT * FROM pg.roles
          ^
SQL state: 42P01
Character: 15
```

Fig. 13: Query Tool - Output error

If the server returns an error, the error message will be displayed on the *Messages* tab, and the syntax that caused the error will be underlined in the SQL editor. If a query succeeds, the *Messages* tab displays how long the query took to

complete and how many rows were retrieved:

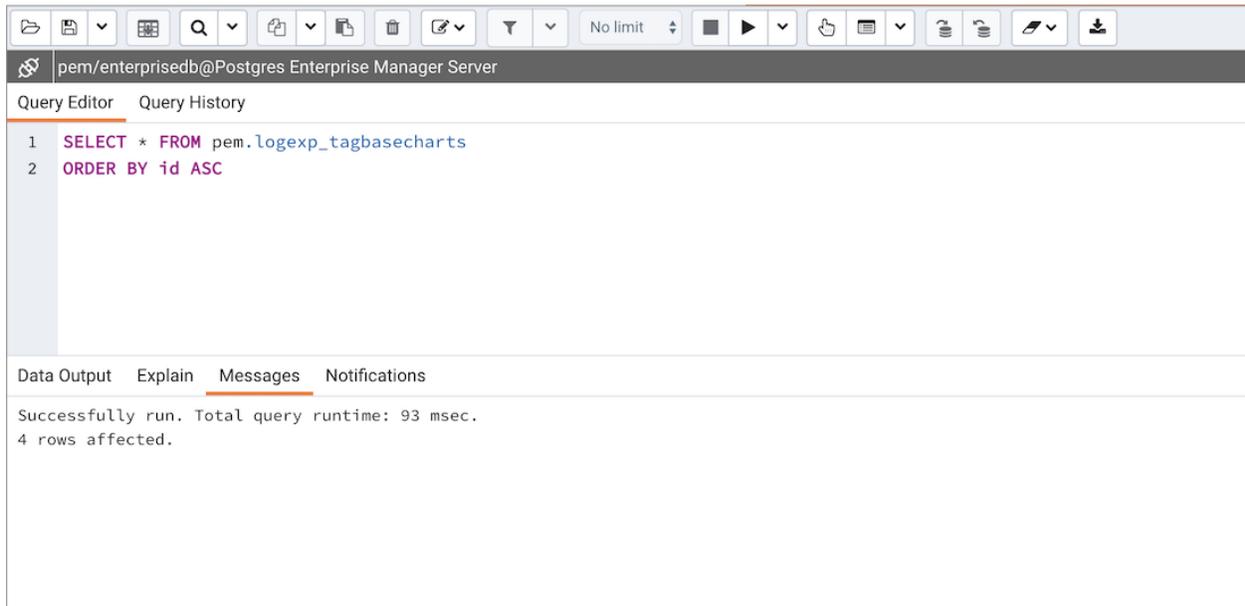


Fig. 14: Query Tool - Messages tab

2.2.7 Notifications Tab

Use the *Notifications* tab to view details of the asynchronous notifications that a client process may have sent:

| Recorded time | Event | Process ID | Payload |
|----------------------------|--------------|------------|-------------------------|
| 2019-11-07 12:53:53.645987 | table_update | 1668 | Updated rows in table_1 |
| 2019-11-07 12:53:53.645987 | table_update | 5376 | Updated rows in table_2 |

Fig. 15: *Query Tool - Output Notifications tab*

You can see details such as recorded time of the asynchronous notification event, name of the event or channel, process ID of the client process that has sent the notification, and the payload string that might have been sent along with the notification.

2.3 Query History Panel

Use the *Query History* tab to review activity for the current session:

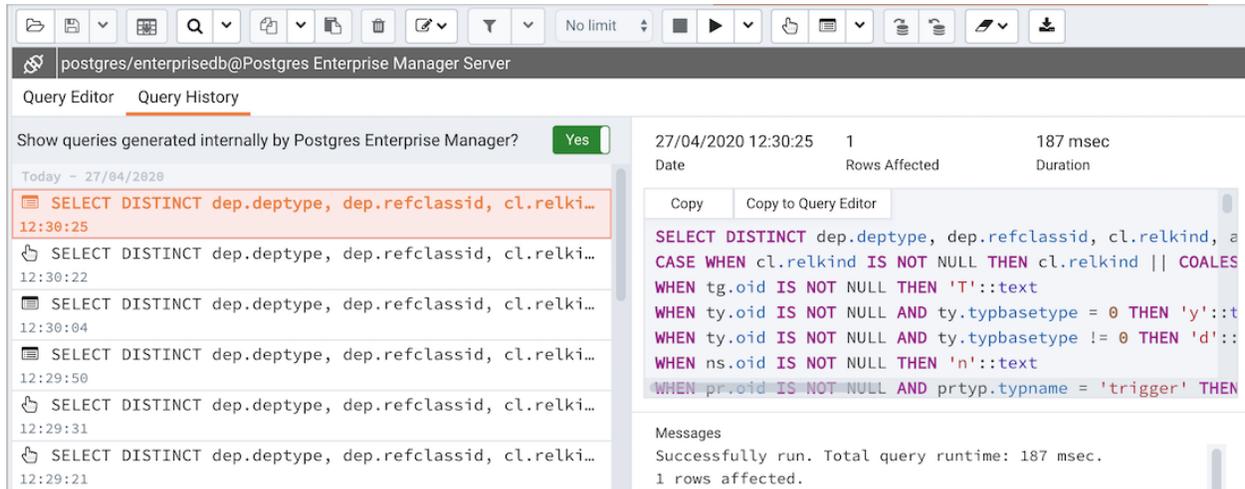


Fig. 16: *Query Tool - Query History tab*

The Query History tab displays information about recent commands:

- The date and time that a query was invoked.
- The text of the query.
- The number of rows returned by the query.
- The amount of time it took the server to process the query and return a result set.
- Messages returned by the server (not noted on the *Messages* tab).
- The source of the query (indicated by icons corresponding to the toolbar).

You can show or hide the queries generated internally by pgAdmin (during ‘View/Edit Data’ or ‘Save Data’ operations).

To erase the content of the *Query History* tab, select *Clear history* from the *Clear* drop-down menu.

Query History is maintained across sessions for each database on a per-user basis when running in Query Tool mode. In View/Edit Data mode, history is not retained. By default, the last 20 queries are stored for each database. This can be adjusted in *config_local.py* by overriding the *MAX_QUERY_HIST_STORED* value.

2.4 Connection Status

Use the *Connection status* feature to view the current connection and transaction status by clicking on the status icon in query tool:

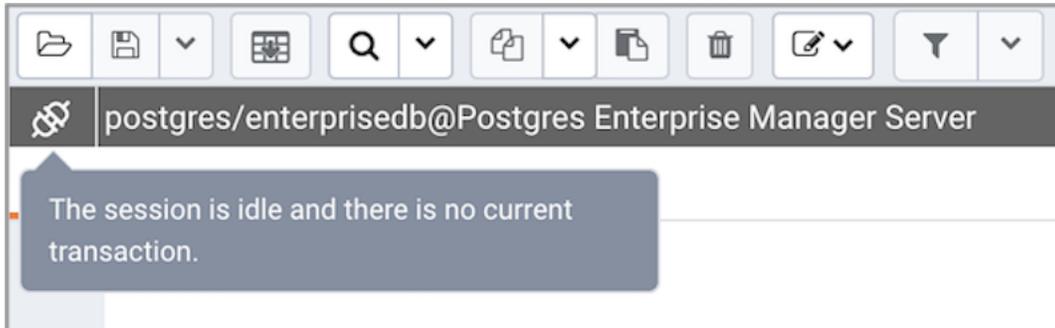


Fig. 17: *Query Tool - Connection Status button*

The PEM Schema Diff Tool

Schema Diff is a feature that allows you to compare schema objects between two database schemas. Use the `Tools` menu to access Schema Diff.

The Schema Diff feature allows you to:

- Compare and synchronize the database schemas (from source to target).
- Visualize the differences between database schemas.
- List the differences in SQL statement for target schema objects.
- Generate synchronization scripts.

Note - The source and target databases must be of the same major version.

Click on `Schema Diff` under the `Tools` menu to open a selection panel. Choose the source and target servers, databases, and schemas that will be compared. After selecting the objects, click on the `Compare` button.

You can open multiple copies of `Schema Diff` in individual tabs simultaneously. To close a copy of `Schema Diff`, click the `X` in the upper-right hand corner of the tab bar.

The screenshot shows the 'Schema Diff (Beta)' dialog. At the top, there are navigation tabs: Dashboard, Properties, SQL, Statistics, Dependencies, Dependents, Monitoring, and Schema Diff (Beta). Below the tabs, there are dropdown menus for 'Select Source' (PostgreSQL 11, postgres, source_sc) and 'Select Target' (PostgreSQL 11, postgres, target_sc). A 'Compare' button is highlighted with a red box. To the right are 'Generate Script' and 'Filter' buttons.

The main area is divided into two sections: 'Schema Objects' and 'Comparison Result'. The 'Schema Objects' section shows a summary: 'Collations - Identical: 0 Different: 1000 Source Only: 1 Target Only: 1'. Below this is a table of objects:

| Object Name | Comparison Result |
|-------------|-------------------|
| abstract | Source Only |
| asset | Target Only |
| col1 | Different |
| col10 | Different |
| col100 | Different |
| col1000 | Different |
| col101 | Different |
| col102 | Different |
| col103 | Different |
| col104 | Different |
| col105 | Different |
| col106 | Different |

The 'DDL Comparison' section is divided into three panels: 'Source', 'Target', and 'Difference'. The 'Source' panel shows DDL for collations in 'source_sc'. The 'Target' panel shows DDL for collations in 'target_sc'. The 'Difference' panel shows a warning and the specific DDL changes needed to reconcile the two schemas.

```

Source
1 -- Collation: coll;
2
3 -- DROP COLLATION source_sc.coll;
4
5 CREATE COLLATION source_sc.coll
6   (LC_COLLATE = 'POSIX', LC_CTYPE = 'POSIX');
7
8 ALTER COLLATION source_sc.coll
9   OWNER TO postgres;

Target
1 -- Collation: coll;
2
3 -- DROP COLLATION target_sc.coll;
4
5 CREATE COLLATION target_sc.coll
6   (LC_COLLATE = 'C', LC_CTYPE = 'C');
7
8 ALTER COLLATION target_sc.coll
9   OWNER TO postgres;

Difference
1 -- WARNING:
2 -- We have found the difference in either of LC
3 -- so we need to drop the existing collation fi
4 DROP COLLATION target_sc.coll;
5
6 CREATE COLLATION target_sc.coll
7   (LC_COLLATE = 'POSIX', LC_CTYPE = 'POSIX');

```

Fig. 1: Schema Diff dialog

Use the Preferences dialog to specify if Schema Diff should open in a new browser tab. Set Open in new browser tab option to true.

The Schema Diff panel is divided into two panels; an Object Comparison panel and a DDL Comparison panel.

3.1 The Schema Diff Object Comparison Panel

In the object comparison panel, you can select the source and target servers of the same major version, databases, and schemas to be compared. You can select any server listed under the browser tree whether it is connected or disconnected. If you select a server that is not connected then it will prompt you for the password before using the server.

Next, select the databases that will be compared. The databases can be the same or different (and within the same server or from different servers).

Lastly, select the source and target schemas which will be compared.



Fig. 2: Schema Diff dialog - Compare button

After you select servers, databases, and schemas, click on the Compare button to obtain the Comparison Result.

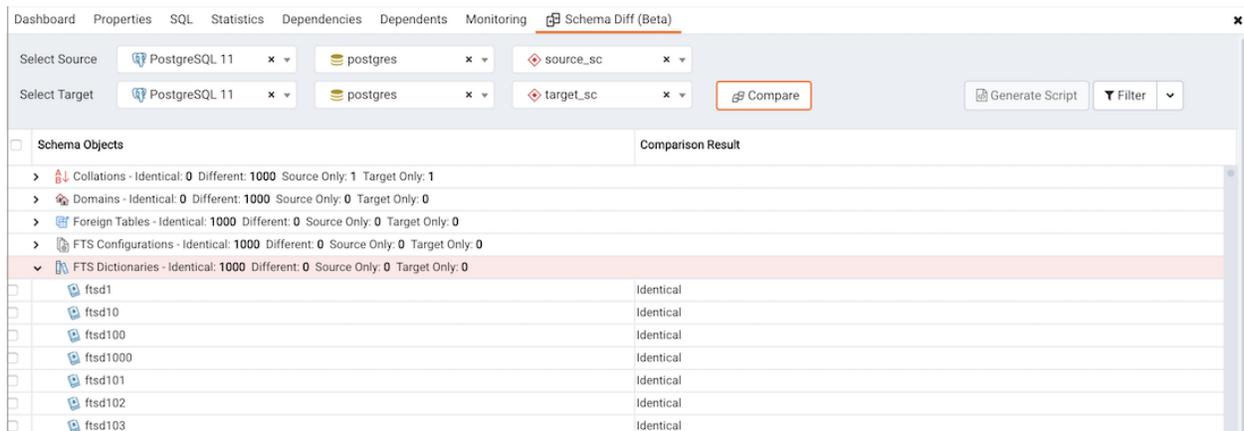


Fig. 3: Schema Diff dialog - Comparison Results

Use the drop-down lists of Functions, Materialized Views, Tables, Trigger Functions, Procedures, and Views to view the DDL statements of all the schema objects.

In the upper-right hand corner of the object comparison panel is a Filter option that you can use to filter the schema objects based on the following comparison criteria:

- **Identical** – If the object is found in both schemas with the same SQL statement, then the comparison result is identical.
- **Different** – If the object is found in both schemas but have different SQL statements, then the comparison result is different.
- **Source Only** – If the object is found in source schema only and not in target schema, then the comparison result is source only.

- **Target Only** – If the object is found in target schema only and not in source schema, then the comparison result is target only.

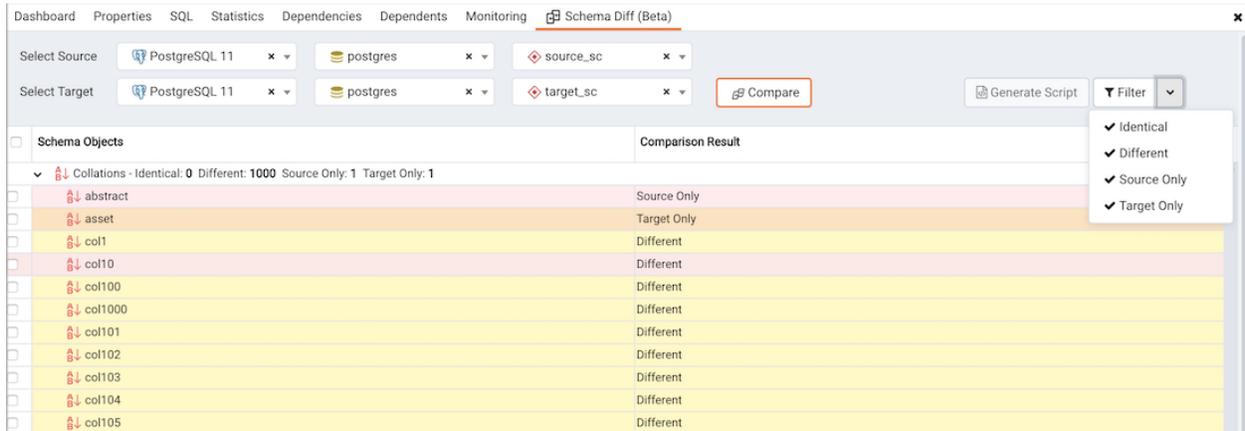


Fig. 4: *Schema Diff dialog - Filter option*

Click on any of the schema objects in the object comparison panel to display the DDL Statements of that object in the DDL Comparison panel.

3.2 Schema Diff DDL Comparison Panel

The DDL Comparison panel displays three columns:

- The first column displays the DDL statement of the object from the source schema.
- The second column displays the DDL statement of the object from the target schema.
- The third column displays the difference in the SQL statement of the target schema object.

The screenshot shows the Schema Diff DDL Comparison panel. At the top, there are dropdowns for 'Select Source' (PostgreSQL 11, postgres, source_sc) and 'Select Target' (PostgreSQL 11, postgres, target_sc). A 'Compare' button is highlighted. Below this is a table of 'Schema Objects' with columns for 'Schema Objects' and 'Comparison Result'. The table lists objects like 'abstract', 'asset', 'col1', 'col10', 'col100', 'col1000', 'col101', 'col102', 'col103', 'col104', 'col105', and 'col106'. The 'Comparison Result' column shows 'Source Only', 'Target Only', or 'Different'. At the bottom, the 'DDL Comparison' section displays three columns: 'Source', 'Target', and 'Difference', each containing SQL DDL statements for collation objects.

Fig. 5: Schema Diff dialog - DDL Comparison panel

You can review the DDL statements of all the schema objects to check for the differences in the SQL statements.

You can also use the Schema Diff tool to generate the SQL script of the differences found in the target schema object based on the SQL statement of the source schema object. To generate the script, select the checkboxes of the schema objects in the object comparison panel and then click on the `Generate Script` button in the upper-right hand corner of the object comparison panel.

The screenshot shows the 'Schema Diff (Beta)' dialog. At the top, there are dropdowns for 'Select Source' (PostgreSQL 11, postgres, source_sc) and 'Select Target' (PostgreSQL 11, postgres, target_sc). A 'Compare' button is highlighted. Below this is a table of 'Schema Objects' with columns for 'Comparison Result'. The table lists objects like 'abstract', 'asset', 'col1', 'col10', etc., with results like 'Source Only', 'Target Only', or 'Different'. At the bottom, the 'DDL Comparison' panel shows 'Source' and 'Target' DDL statements, and the 'Difference' panel shows the generated SQL script with a 'Copy' button.

Fig. 6: Schema Diff dialog - Generate Script button

Select the schema objects and click on the Generate Script button to open the Query Tool in a new tab, with the difference in the SQL statement displayed in the Query Editor.

If you have clicked on the schema object to check the difference generated in the DDL Comparison Panel, and you have not selected the checkbox of the schema object, PEM will open the Query Tool in a new tab, with the differences in the SQL statements displayed in the Query Editor.

You can also use the Copy button to copy the difference generated in the DDL Comparison panel.

The screenshot shows the 'Query Editor' in a new tab. The editor contains the following SQL script:

```

1  |-- This script was generated by a beta version of the Schema Diff utility in Postgres Enterprise Manager.
2  |-- This version does not include dependency resolution, and may require manual changes
3  |-- to the script to ensure changes are applied in the correct order.
4  |-- Please report an issue for any failure with the reproduction steps.
5  BEGIN;
6  -- WARNING:
7  -- We have found the difference in either of LC_COLLATE or LC_CTYPE or LOCALE,
8  -- so we need to drop the existing collation first and re-create it.
9  DROP COLLATION target_sc.coll100;
10
11 CREATE COLLATION target_sc.coll100
12 (LC_COLLATE = 'POSIX', LC_CTYPE = 'POSIX');
13 END;

```

Fig. 7: Schema Diff dialog - Generate Script - Query Editor

Apply the SQL Statement in the target schema to synchronize the schemas.

Performance Monitoring and Management

PEM contains built-in functionality that implements enterprise-wide performance monitoring of all managed servers. While you can customize many aspects of the various performance monitoring aspects of PEM, you can also elect to accept the recommended defaults that come out-of-the-box with the product.

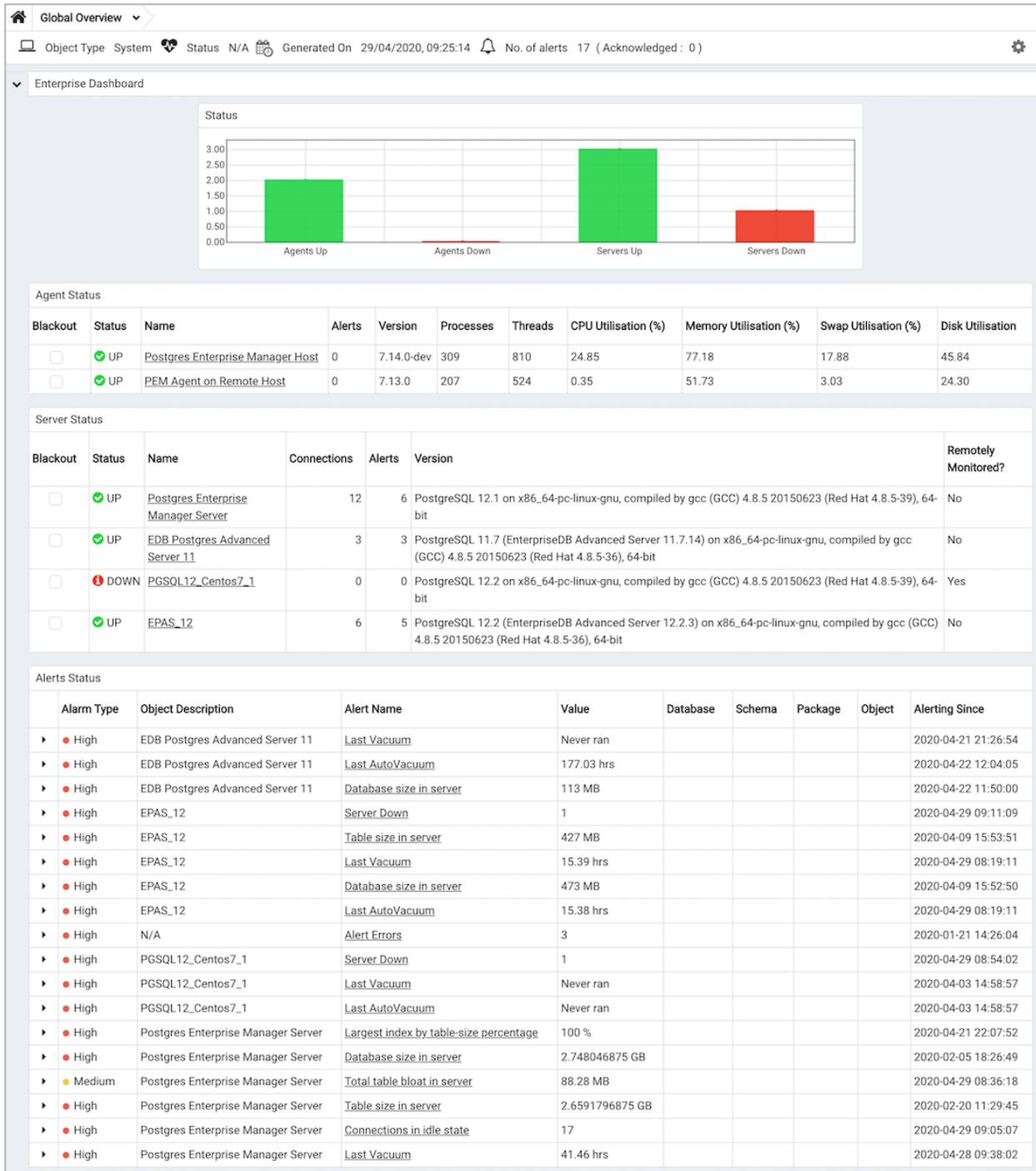


Fig. 1: The Global Overview dashboard

The top-level dashboard is the Global Overview. The Global Overview presents a status summary of all the servers and agents that are being monitored by the PEM server, a list of the monitored servers, and the state of any currently triggered alerts.

4.1 Using Dashboards to View Performance Information

PEM displays performance statistics through a number of dashboards; each dashboard contains a series of summary views that contain charts, graphs and tables that display the statistics related to the selected object.

The PEM client displays the `Global Overview` dashboard when it connects to the PEM server. Additional dashboards provide statistical information about monitored objects. These include the:

Alerts Dashboard

The Alerts dashboard displays the currently triggered alerts. If opened from the Global Overview, the dashboard displays the current alerts for all monitored nodes on the system; if opened from a node within a server, the report will reflect alerts related to that node, and all monitored objects that reside below that object in the tree control.

Audit Log Analysis dashboard

For Advanced Server users, the Audit Log Analysis dashboard allows you to browse the audit logs that have been collected from instances that have audit logging and collection enabled.

Database Analysis dashboard

The Database Analysis dashboard displays performance statistics for the selected database.

I/O Analysis dashboard

The I/O Analysis dashboard displays I/O activity across various areas such as object DML activity, log operations and more.

Memory Analysis dashboard

The Memory Analysis dashboard supplies statistics concerning various memory-related metrics for the Postgres server.

Object Activity Analysis dashboard

The Object Activity Analysis dashboard provides performance details on tables/indexes of a selected database.

Operating System Analysis dashboard

The Operating System Analysis dashboard supplies information regarding the performance of the underlying machine's operating system.

Probe Log Analysis Dashboard

The Probe Log Analysis dashboard displays any error messages returned by a PEM agent.

Server Analysis dashboard

The Server Analysis dashboard provides general performance information about the overall operations of a selected Postgres server.

Server Log Analysis dashboard

The Server Log Analysis dashboard allows you to filter and review the contents of server logs that are stored on the PEM server.

Session Activity Analysis dashboard

The Session Activity Analysis dashboard provides information about the session workload and lock activity for the selected server

Session Waits Analysis dashboard

The Session Waits Analysis dashboard provides an overview of the current DRITA wait events for an Advanced Server session.

Storage Analysis dashboard

The Storage Analysis dashboard displays space-related metrics for tablespaces and objects.

System Waits Analysis dashboard

The System Waits Analysis dashboard displays a graphical analysis of system wait information for an Advanced Server session.

Streaming Replication Analysis dashboard

The Streaming Replication Analysis dashboard displays statistical information about WAL activity for a monitored server and allows you to monitor the status of Failover Manager clusters.

There are two ways to open a dashboard; you can:

- Select an active dashboard name from the `Dashboards` menu (accessed via the Management menu).
- Right click on the name of a monitored object in the tree control and select the name of the dashboard you would like to review from the `Dashboards` menu.

Each dashboard is displayed on the `Monitoring` tab in the main panel of the client window. After opening a dashboard, you can navigate to other dashboards within the same tab.

Each dashboard header includes navigation menus that allow you to navigate to other dashboards; use your browsers forward and back icons to scroll through previously-viewed dashboards. Use the Refresh icon to update the current dashboard.

Options on the `Dashboard Configuration` dialog allow you to link the time lines of all of the line graphs on the dashboard. To open the `Dashboard Configuration` dialog, click the Settings icon displayed in the dashboard header.

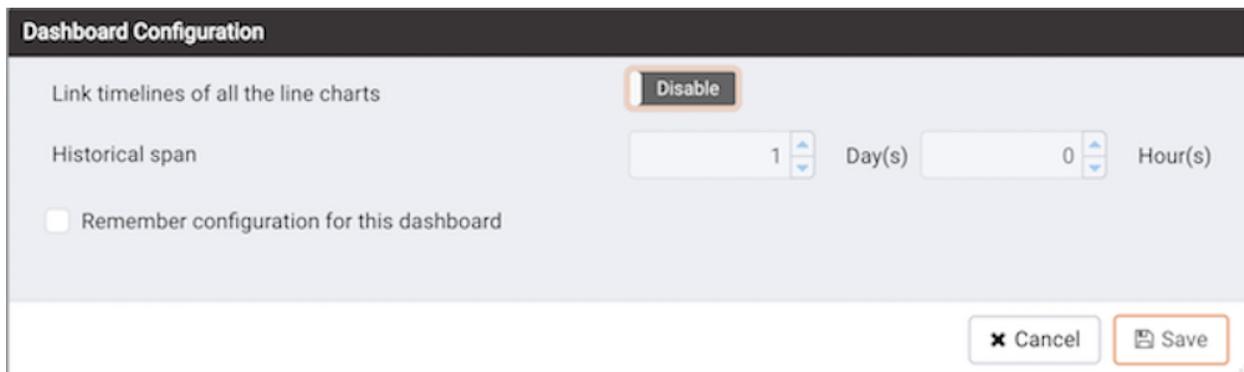


Fig. 2: *The Dashboard Configuration dialog*

Use fields on the `Dashboard Configuration` dialog to control attributes of the charts displayed on the dashboard:

- Set the Link timelines of all the line charts slider to Enable to indicate that the specified timeline should be applied to line graphs displayed on the dashboard; if set to Disable, your preferences will be preserved for later use, but will not modify the amount of data displayed.
- Use the `Days` selector to specify the number of days of gathered data that should be displayed on line graphs.
- Use the `Hour(s)` selector to specify the number of hours of gathered data that should be displayed on line graphs.

- Check the box next to Remember configuration for this dashboard to indicate that the customized time span should be applied to the current dashboard only; if left unchecked, the time span will be applied globally to line graphs on all dashboards.

Please note that settings specified on the Dashboard Configuration dialog are applied only to the current user's session.

4.2 Managing Custom Dashboards

PEM displays performance statistics through a number of system-defined dashboards; each dashboard contains a series of summary views that contain charts, graphs and tables that display statistics related to the selected object. You can use the `Manage Dashboards` tab to create and manage custom dashboards that display the information that is most relevant to your system.

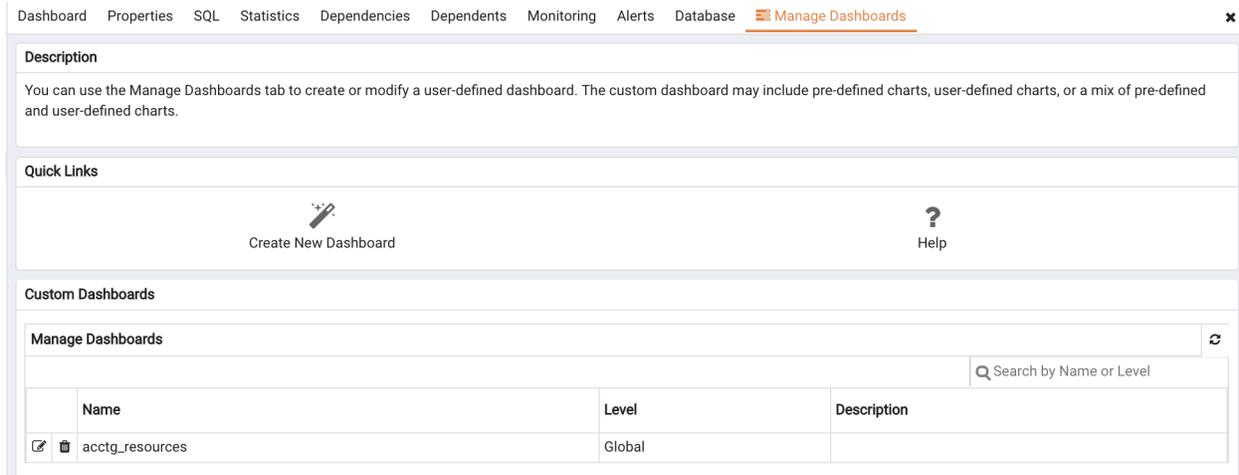


Fig. 3: *The Manage Dashboards tab*

To create a custom dashboard, click the `Create New Dashboard` link (located in the `Quick Links` section of the `Manage Dashboards` tab).

To modify an existing dashboard, click the edit icon to the left of a dashboard name. The dashboard editor will open, displaying the definition of the dashboard. When you've finished modifying the dashboard's definition, click the `Save` button to preserve your changes; click `Cancel` to exit without saving your changes.

To delete a dashboard, click the delete icon to the left of a dashboard name. A popup will ask you to confirm that you wish to delete the dashboard; click `OK` to delete the selected dashboard.

4.2.1 Creating a Custom Dashboard

You can use the PEM dashboard editor to create or modify a user-defined dashboard. The custom dashboard may include pre-defined charts, user-defined charts or a mix of pre-defined and user-defined charts.

The screenshot shows the 'Create Dashboard editor' interface. It is divided into several sections:

- Configure:**
 - Name: test1
 - Level: Database
 - Description: test1
- Ops dashboard options:**
 - Ops dashboard?: No
 - Show title?: Yes
 - Font: [Dropdown menu]
 - Font size: [Dropdown menu]
- Permissions:**
 - Share with all users?: Yes
 - Access permissions: [Text area with placeholder: Specify the user groups that will have access to the new dashboard.]
- Dashboard Layout Design:**
 - Section #1

At the bottom right, there are 'Cancel' and 'Save' buttons.

Fig. 4: The Create Dashboard editor

Use the fields in the `Configure` section to specify general information about the dashboard:

- Specify a name for the dashboard in the `Name` field. The name specified will also be the title of the dashboard if the title is displayed.
- Use the `Level` drop-down listbox to specify the level of the PEM hierarchy within the PEM client on which the dashboard will be displayed. A dashboard may be accessed via the Dashboards menu on a Global level, an Agent level, the Server level or the Database level. Each selected level within the list will expose a different set of metrics on which the custom dashboard's charts may be based.
- Provide a description of the dashboard in the `Description` field.

Provide information in the fields in the `Ops dashboard options` box if the dashboard will be used as an Ops dashboard:

- Set the `Ops Dashboard?` field to `Yes` to instruct the server to create a dashboard that is formatted for display on an Ops monitor.
- Set the `Show Title?` field to `Yes` to display the dashboard name at the top of the Ops dashboard.
- Use the `Font` drop-down list box to select a custom font style for the title. The selected font style will be displayed in the Preview box.
- Use the `Font size` drop-down list box to select a custom font size for the title. The selected font style will be displayed in the Preview box.

Use the `Permissions` box to specify the users that will be able to view the new dashboard:

- Set the `Share with all` slider to `Yes` to instruct the server to allow all Teams to access the dashboard, or set `Share with all` to `No` to enable the `Access permissions` field.
- Use the `Access permissions` field to specify which roles can view the new dashboard. Click in the field, and select from the list of users to add a role to the list of users with dashboard access.

When you've completed the `Configure Dashboard` section, click the arrow in the upper-right corner to close the section, and access the `Dashboard Layout Design` section.

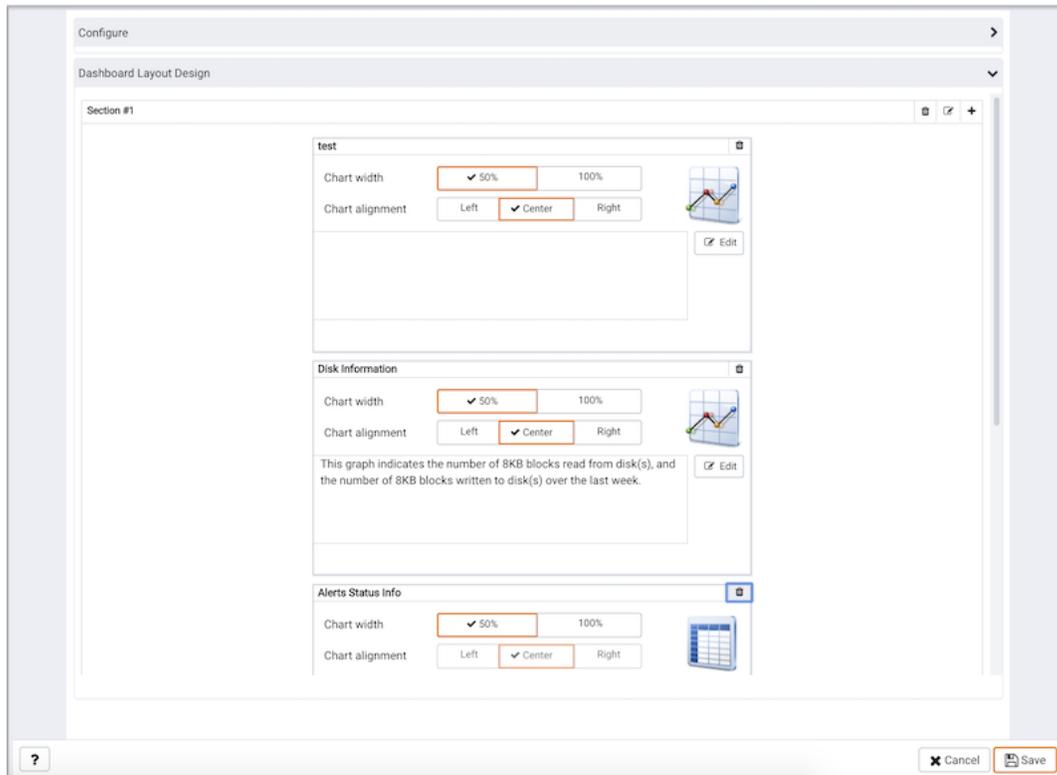


Fig. 5: *Modifying a Section Header*

Click the edit icon in a section header to specify a section name; then, click the add icon (+) to add a chart to the section.

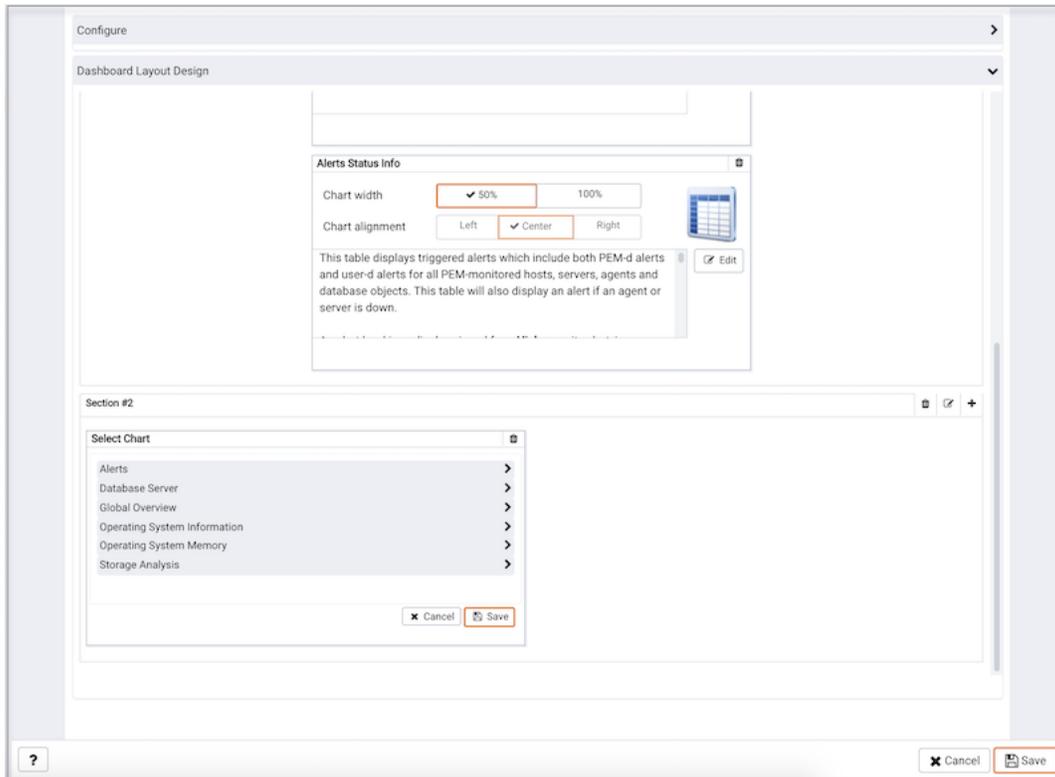


Fig. 6: Adding a Chart

Use the arrows to the right of each chart category to display the charts available and select a chart.

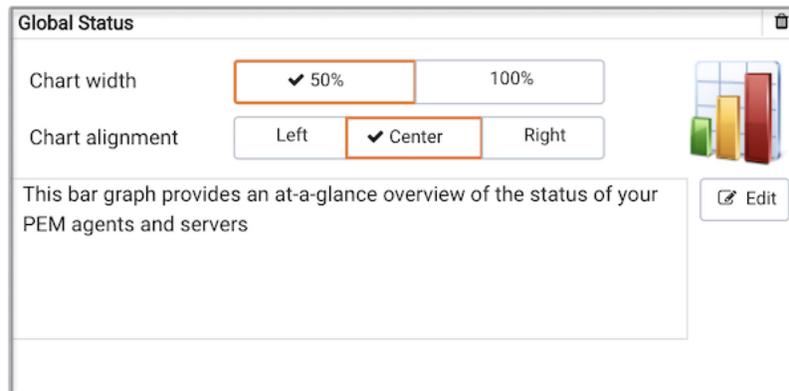


Fig. 7: Specifying placement details for a chart

Use the chart detail selectors to specify placement details for the chart:

- Use the `Chart width` selector to indicate the width of the chart; select `50%` to display the chart in half of the dashboard, or `100%` to use the whole dashboard width.
- Use the `Chart alignment` selector to indicate the position of the chart within the section:
 - Select `Left` to indicate that the chart should be left-justified.
 - Select `Center` to indicate that the chart should be centered.

Select `Right` to indicate that the chart should be right-justified.

Please note that tables are always displayed centered.

When creating or editing a custom dashboard, you can use drag and drop to re-arrange the charts within a section or to move a chart to a different section.

To add another chart to your dashboard, click the add icon (+) in the section header. When you've finished editing the dashboard, click the `Save` button to save your edits and exit.

To exit without saving your changes, click the `Cancel` button.

4.2.2 Creating an Ops Dashboard

You can use the PEM dashboard editor to create a custom dashboard formatted for display on an Ops monitor. An Ops dashboard displays the specified charts and graphs, while omitting header information and minimizing extra banners, titles, and borders.



Fig. 8: *Ops dashboard options*

To create an Ops dashboard, provide detailed information about the Ops display in the Ops dashboard options section of the Create Dashboard dialog.

- Set the Ops Dashboard? field to Yes to instruct the server to create a dashboard that is formatted for display on an Ops monitor.
- Set the Show Title? field to Yes to display the dashboard name at the top of the Ops dashboard.
- Use the Font drop-down list box to select a custom font style for the title. The selected font style will be displayed in the Preview box.
- Use the Font size drop-down list box to select a custom font size for the title. The selected font size will be displayed in the Preview box.

After adding charts and tables to the Ops dashboard, click the Save button to save your work. You can then access the dashboard by navigating through the Dashboards menu of the hierarchy level specified in the Level field on the New Dashboard dialog.

4.3 Using the Manage Charts tab

You can use the `Manage Charts` tab to access dialogs that allow you to create or modify a custom line chart or table, or import a Capacity Manager template for use in a custom chart. After defining a chart, you can display the chart on a custom dashboard. To open the `Manage Charts` tab, select `Manage Charts...` from the PEM client Management menu.

Description

The PEM chart manager allows you create, edit, or delete custom charts. Custom charts are displayed on user-defined custom dashboards. Capacity Manager templates store metric definitions that can be re-used on future charts.

Quick Links

 Create New Chart
  Import Capacity Manager Template
  Help

Custom Charts

Search chart by Name, Type, Level or Category

| | Name | Type | Level | Metrics Category |
|---|-------|--|----------|--------------------------|
|   | test1 |  Table | Database | Database Object Activity |
|   | Test1 |  Line Chart | Agent | Alerts |

Fig. 9: The Manage Charts tab

The `Manage Charts` tab provides a `Quick Links` menu that allows you to access dialogs to:

- Create a New Chart for use on a custom dashboard.
- Import a Capacity Manager template to use as a template for creating a custom chart.
- Access online Help.

The `Custom Charts` table displays a list of user-defined charts; when a chart is newly added, the font displays in green. When you add an additional chart or refresh the screen, the name of the chart is displayed in black.

Custom Charts

Search chart by Name, Type, Level or Category

| | Name | Type | Level | Metrics Category |
|---|-------|--|----------|--------------------------|
|   | test1 |  Table | Database | Database Object Activity |
|   | Test1 |  Line Chart | Agent | Alerts |

Fig. 10: The Custom Charts table

Use the search box in the upper-right hand corner of the `Custom Charts` table to search through your custom charts. Specify a:

- Chart name
- Type
- Level
- Metrics Category

Use icons to the left of a charts name in the `Custom Charts` table to manage a chart:

- Click the edit icon to open the Chart Configuration wizard and modify aspects of the chart or table.
- Click the delete icon to delete the selected chart.

4.3.1 Creating a Custom Chart

Click the **Create New Chart** icon in the **Quick Links** section of the **Manage Charts** tab to open the **Create Chart** wizard. The wizard will walk you through the steps required to define a new chart.

Fig. 11: *Specifying general information about the chart*

Use the fields on the **Configure Chart** dialog to specify general information about the chart:

- Specify the name of the chart in the **Name** field.
- Use the drop-down listbox in the **Category** field to specify the category in which this chart will be displayed; when adding a custom chart to a custom dashboard, the chart will be displayed for selection in the category specified.
- Use the radio buttons in the **Type** field to specify if the chart will be a **Line chart** or a **Table**.
- Provide a description of the chart in the **Description** field. The description will be displayed to the user viewing the chart (on a custom dashboard) when they click the information icon.

When you've completed the fields on the **Configure Chart** dialog, click **Next** to continue.

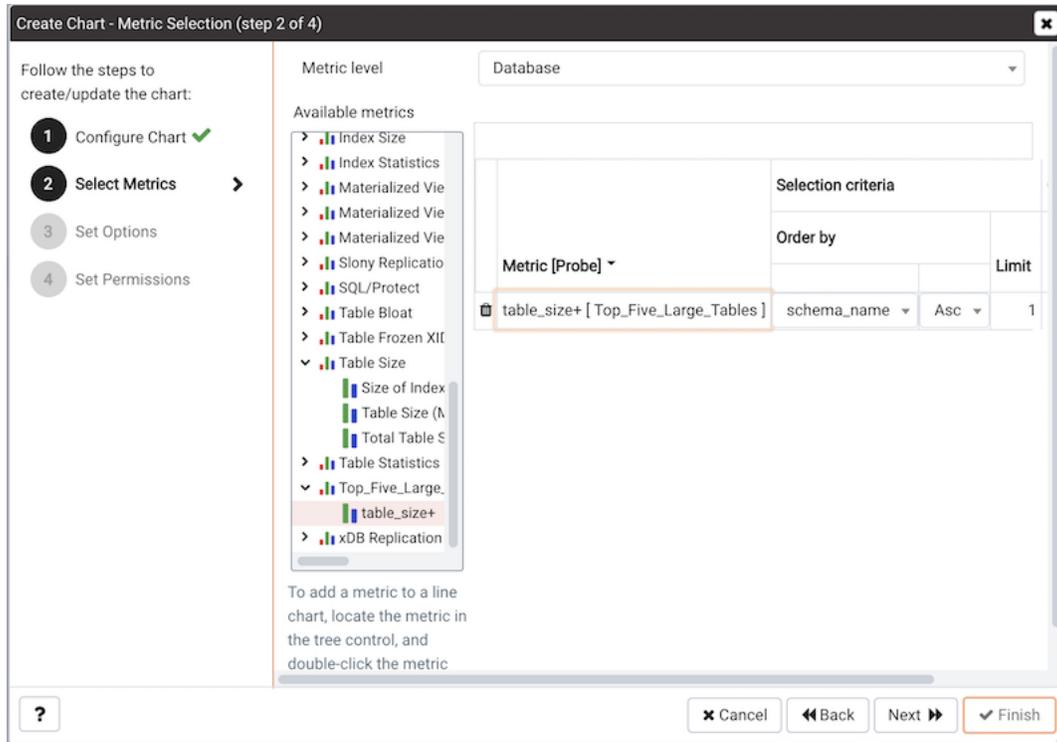


Fig. 12: Specifying the metrics that will be displayed

Use the fields on the `Select Metrics` dialog to select the metrics that will be displayed on the chart.

- Use the `Metric level` drop-down listbox to specify the level of the PEM hierarchy from which you wish to select metrics. You can specify Agent, Database, or Server. Each level offers access to a unique set of probes and metrics.
- Use the tree control in the `Available metrics` box to select the metrics that will be displayed on the chart.

If you are creating a table, you may only select metrics from one probe; each node of the tree control lists the metrics returned by a single probe. Expand a node of the tree control, and check the boxes to the left of a metric name to include that metric data in the table.

If you are creating a line chart, expand the nodes of the tree control and double-click each metric that you would like to include in the chart.

- Use the fields in the `Selected metrics` panel to specify how the metric data will be displayed in your chart. The selection panel displays the name of the metric in the (non-modifiable) `Metric [Probe]` column. You can:
 - Click the garbage can icon to delete a metric from the list of selected metrics.
 - Use the drop-down listboxes in the `Selection Criteria` column to specify the order of the data displayed.
 - Use the `Limit` field to specify the number of rows in a table or lines in a chart:

The maximum number of lines allowed in a chart is 32.

The maximum number of rows allowed in a table is 100.

- If you are creating a line chart, PEM supports comparisons of cross-hierarchy metrics.
 - Click the `compare` icon to open a selection box that allows you to select one or more probe-specific attributes (i.e. CPUs, interfaces, databases, etc.) to compare in the chart.

- Click the `copy` icon to apply your selections to all of the metrics for the same probe. When the popup opens, click `Yes` to confirm that other selections for the same probe will be overwritten, or `No` to exit the popup without copying the attributes.

When you've completed the fields on the `Select Metrics` dialog, click `Next` to continue.

Fig. 13: *Specifying chart options*

Use the fields on the `Set Options` dialog to specify display options for your chart:

- Use the `Auto Refresh` field to specify the number of minutes between chart updates - choose a value from 1 to 120. The default auto refresh rate is 2 minutes.

Use fields under the `Line chart options` heading to specify display preferences for a line chart:

- Use the `Points to plot` field to specify the maximum number of points that will be plotted on the chart.
- Use the fields to the right of the `Historical span` label to specify how much historical data should be displayed on the chart:

Use the `Day(s)` field to specify the number of days of historical data that should be included on the chart.

Use the `Hour(s)` field to specify the number of hours of historical data that should be included on the chart.

Use the `Minute(s)` field to specify the number of minutes of historical data that should be included on the chart.

Use the fields in the `Data extrapolation` box to specify if PEM should generate extrapolated data based on historical data:

- Click the `No Extrapolation` label to omit extrapolated data from the chart.
- Click the `Span` label to use the `Days` and `Hours` selectors to specify the period of time spanned by the metrics on the chart.

- Click the `Threshold` label to use threshold selectors to specify a maximum or minimum value for the chart.

When you've completed the fields on the `Set Options` dialog, click `Next` to continue.

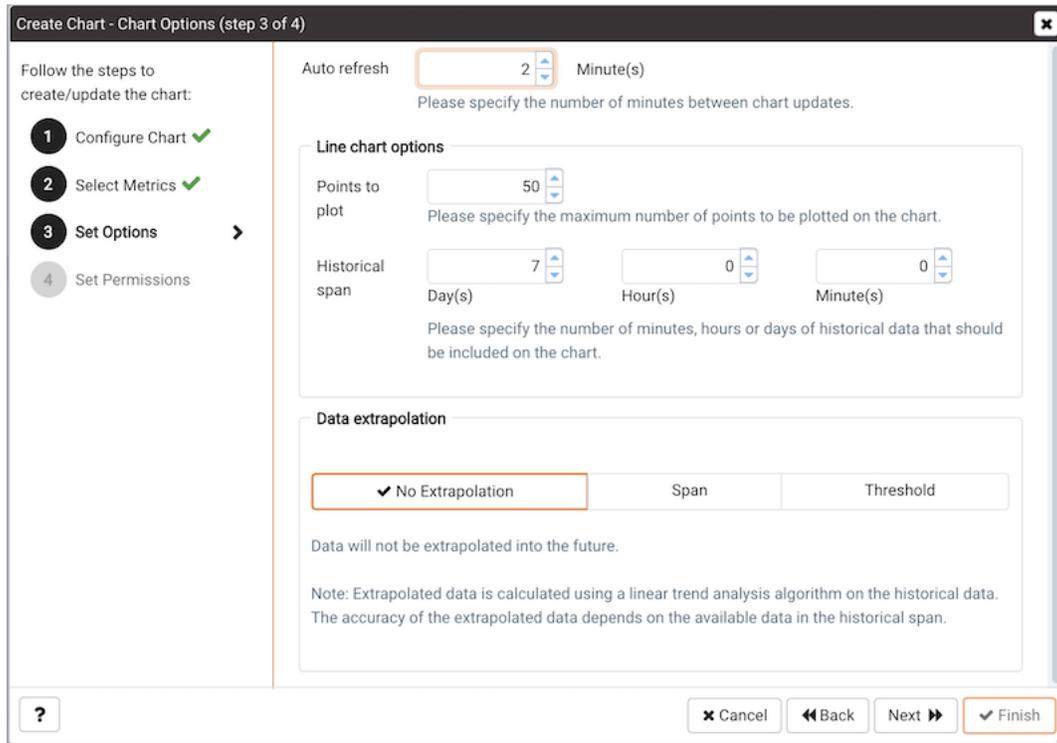


Fig. 14: *Specifying access permissions*

Use the fields on the `Set Permissions` dialog to specify display options for your chart.

- Set the `Share with all` slider to `Yes` to indicate that the chart will be available to all authorized users, or `No` to restrict access to the users or groups specified in the `Access permissions` field.
- Use the `Access permissions` field to select the group or groups that will have access to the chart.

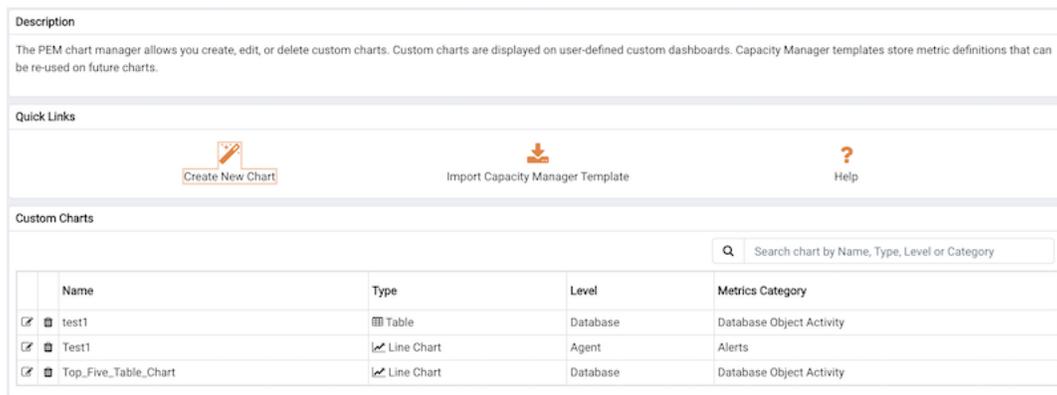


Fig. 15: *The chart definition is displayed on the Manage Charts tab*

When you've finished defining the chart, click `Finish` to save your edits and add your chart to the list on the `Manage Charts` tab.

4.3.2 Importing a Capacity Manager Template

Click the `Import Capacity Manager Template` icon in the `Quick Links` section of the `Manage Charts` tab to open the `Create Chart` dialog, and use a `Capacity Manager` template as a starting point for a chart or table.

Fig. 16: *Importing a Capacity Manager template*

When the `Create Chart` dialog opens, provide information about the custom chart:

- Use the drop-down listbox in the `Import capacity template` field to select the name of the template on which the chart will be based.
- Specify the name of the chart in the `Name` field.
- Use the drop-down listbox in the `Category` field to specify the category in which this chart will be displayed. When adding a custom chart to a custom dashboard, the chart will be displayed for selection in the `Category` specified.
- Use the radio buttons in the `Type` field to specify if the chart will be a `Line chart` or a `Table`.
- Provide a description of the chart in the `Description` field. The description will be displayed to the user viewing the chart (on a custom dashboard) when they click the information icon.

Click `Next` to continue to the `Select Metrics` dialog.

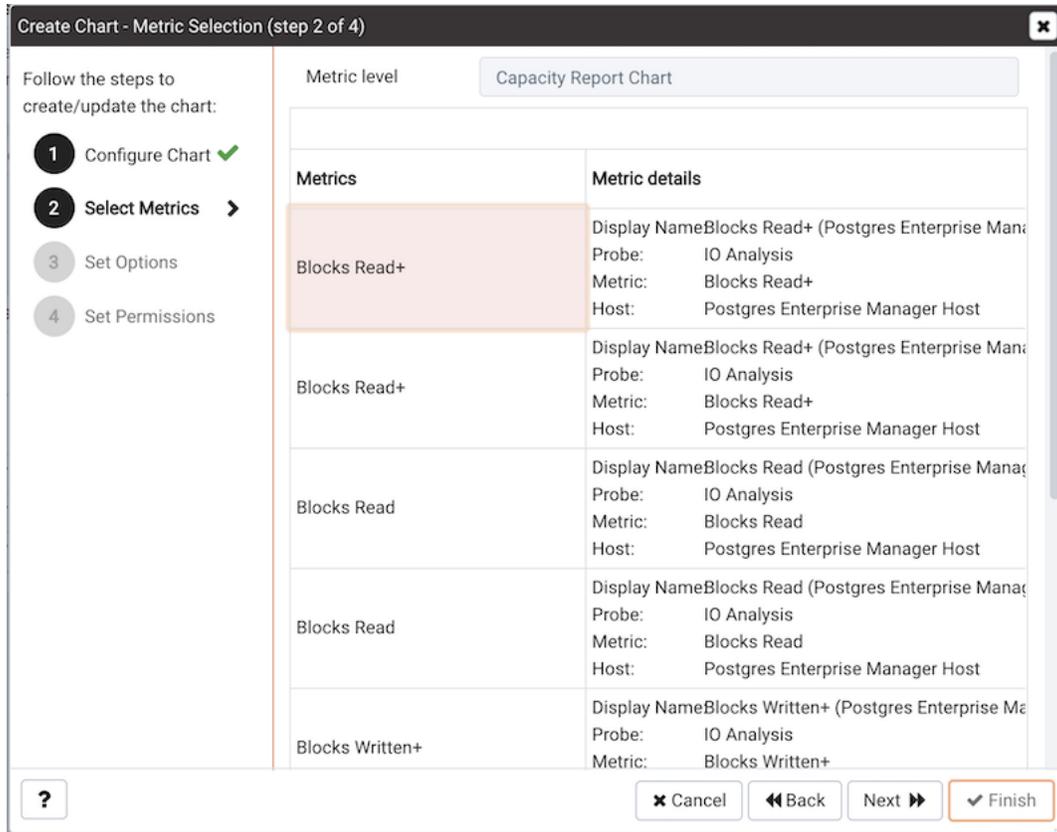


Fig. 17: *The template metrics*

The `Select Metrics` window allows you to review the metrics specified by the selected template. The bottom panel of the chart editor displays the metrics that will be included in the chart. The metrics included in the chart are not modifiable via the chart editor; to modify the metrics, you must use the Capacity Manager utility to update the template.

When you've reviewed the metrics, click `Next` to continue to the `Set Options` dialog.

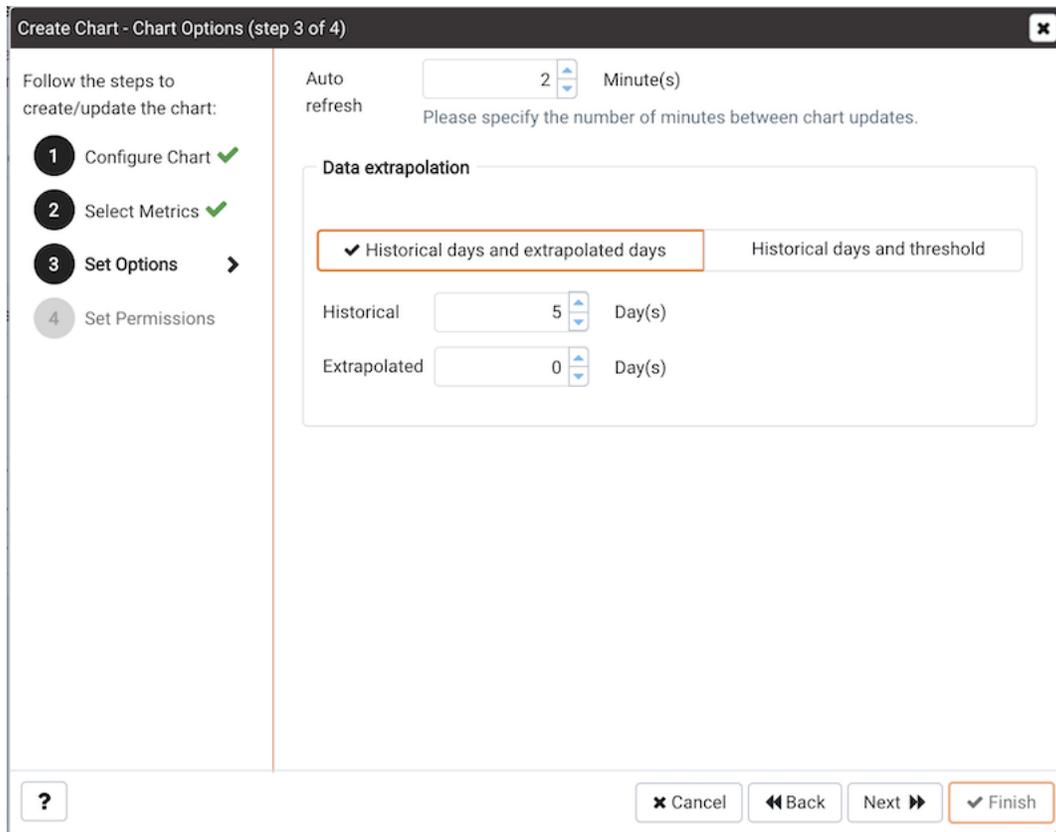


Fig. 18: Selecting chart options

Use the fields on the `Set Options` window to specify display options for your chart:

- Use the `Auto Refresh` field to specify the number of minutes between chart updates - choose a value from 1 to 120. The default auto refresh rate is 2 minutes.

Use the fields in the `Data extrapolation` box to specify the time period covered by the chart. You can either:

- click the `Historical days and extrapolated days` label and provide:
 - the number of days of historical data that should be charted in the `Historical` field.
 - the number of projected days that should be charted in the `Extrapolated` field.
- or, click the `Historical days and threshold` label and provide:
 - the number of days of historical data that should be charted in the `Historical` field
 - the `threshold` value at which the chart will end.

When you've completed the `Set Options` window, click `Next` to continue.

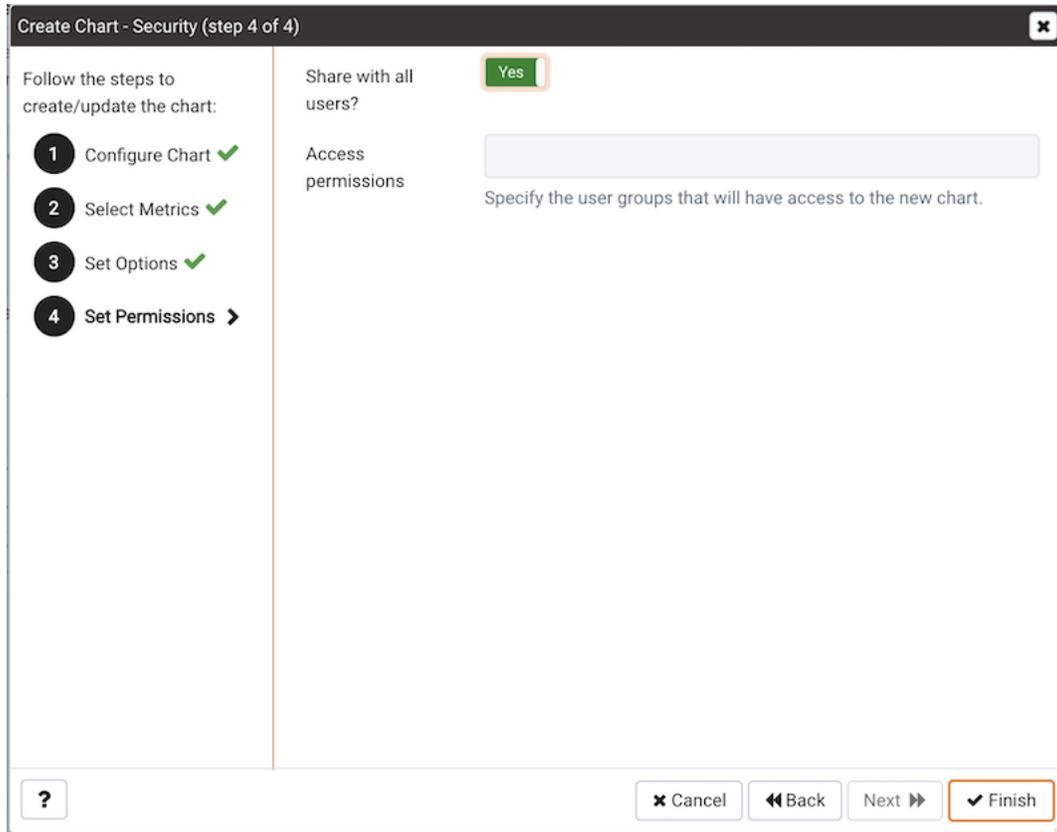


Fig. 19: *Selecting permissions for the chart*

Use the fields on the `Set Permissions` window to specify display options for your chart:

- Set the `Share with all` slider to `Yes` to indicate that the chart will be available to all authorized users, or `No` to restrict access to the users or groups specified in the `Access permissions` field.
- Use the `Access permissions` field to select the group or groups that will have access to the chart.

When you've finished defining the chart, click `Finish` to save your edits and add your chart to the list on the `Manage Charts` tab.

4.4 Customizing Probes

A probe is a scheduled task that returns a set of performance metrics about a specific monitored object. A probe retrieves statistics from a monitored server, database, operating system or agent. You can use the `Manage Probes` tab to override the default configuration and customize the behavior of each probe.

To open the `Manage Probes` tab, select `Manage Probes . . .` from the `Management` menu. The `Manage Probes` tab opens in the PEM client.

Properties SQL Statistics Dependencies Dependents Monitoring **Manage Probes** x

Description

Manage Custom Probes: PEM uses probes to retrieve statistics from a monitored server, database, operating system or agent. You can view, reconfigure, delete, or create your own custom probes.

Copy Probes: PEM allows copying of probes from any chosen object recursively down through the object hierarchy. Click on Copy Probes to quickly copy the displayed probe configuration to a selected target.

Quick Links

 Manage Custom Probes
  Copy Probes
  Help

Probes

| Probe name | Execution Frequency | | | Enabled? | | Data Retention | | |
|--|-------------------------------------|---------|---------|-------------------------------------|-------------------------------------|-------------------------------------|------|--|
| | Default? | Minutes | Seconds | Default? | Probe Enable? | Default? | Days | |
| Background Writer Statistics | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Blocked Session Information | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Data and Log File Analysis | <input checked="" type="checkbox"/> | 0 | 10 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Database Frozen XID | <input checked="" type="checkbox"/> | 720 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Database Size | <input checked="" type="checkbox"/> | 30 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Database Statistics | <input checked="" type="checkbox"/> | 30 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 90 | |
| Failover Manager Cluster Info | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 7 | |
| Failover Manager Node Status | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 7 | |
| Lock Information | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Number of Prepared Transactions | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Number of WAL Files | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Object Catalog: Database | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Object Catalog: Tablespace | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| PG HBA Conf | <input checked="" type="checkbox"/> | 30 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Server Information | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Server log Configuration | <input checked="" type="checkbox"/> | 0 | 10 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Session Information | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Settings | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Streaming Replication | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Streaming Replication Database Conflicts | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Streaming Replication Lag Time | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Tablespace Size | <input checked="" type="checkbox"/> | 30 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| User Information | <input checked="" type="checkbox"/> | 30 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| WAL Archive Status | <input checked="" type="checkbox"/> | 30 | 0 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |

Fig. 20: *The Manage Probes tab*

The `Manage Probes` tab provides a set of Quick Links that you can use to create and manage probes:

- Click the `Manage Custom Probes` icon to open the `Custom Probes` tab and create or modify a custom

probe.

- Click the `Copy Probes` icon to open the Copy Probe dialog, and copy the probe configurations from the currently selected object to one or more monitored objects.

A probe monitors a unique set of metrics for each specific object type (server, database, database object, or agent); select the name of an object in the tree control to review the probes for that object.

To modify the properties associated with a probe, highlight the name of a probe, and customize the settings that are displayed in the Probes table:

- Move the `Default` switch in the `Execution Frequency` columns to `N` to enable the `Minutes` and `Seconds` selectors, and specify a non-default value for the length of time between executions of the probe.
- Move the `Default` switch in the `Enabled?` column to `No` to change the state of the probe, and indicate if the probe is active or not active.

Note: If data from a disabled probe is used in a chart, the chart will display an information icon in the upper-left corner that allows you to enable the probe by clicking the provided link.

- Move the `Default` switch in the `Data Retention` column to `No` to enable the `Day(s)` field and specify the number of days that information gathered by the probe is stored on the PEM server.

The `Manage Probes` tab may display information about probes that cannot be modified from the current node. If a probe cannot be modified from the current dialog, the switches are disabled. Generally, a disabled probe can be modified from a node that is higher in the hierarchy of the PEM client tree control; select another object in the tree control to modify which probes are displayed or enabled in the `Manage Probes` tab.

4.4.1 Creating a Custom Probe

You can use the PEM Custom Probes tab to create a new probe or modify an existing user-defined probe. To open the Custom Probes tab, select the Manage Custom Probes . . . icon from the Manage Probes tab.

Properties SQL Statistics Dependencies Dependents Monitoring Manage Probes **Probes** ✕

Description

System Probes: System probes are the built-in probes provided by PEM and are part of the PEM schema. These probes are differentiated in the Probes list by a grey background. You may only modify the Enabled, Interval and Data retention fields of a system probe.

Probes: Custom probes are those probes created by users. You can modify the Enabled, Interval and Data retention fields in the General tab, the Unit and Graphable fields of each column on the Columns tab, the code provided in the Code tab, and the code definition on the Alternate Code tab of a user-defined probe if the Applies to all database server versions? field for that probe is set to No.

You may delete only user-defined probes. When you delete a probe, the probe is marked for deletion and will be deleted later (when custom probes are purged). During the deletion the probe definition is deleted and any corresponding tables are dropped from the pemdata and pemhistory schemas.

Probes Show System Probes? No

| | Probe name | Collection method | Target type | Execution frequency | | Probe enabled? | Data retention |
|-------------------------------------|-----------------------|-------------------|-------------|---------------------|---------|-------------------------------------|----------------|
| | | | | Minutes | Seconds | | |
| <input checked="" type="checkbox"/> | Top_Five_Large_Tables | SQL | Table | 1 | 0 | <input checked="" type="checkbox"/> | 1 |

Fig. 21: *The Custom Probes dialog*

Use the Show System Probes? switch to display or conceal the system probes on the Custom Probes tab.

You can use the Custom Probes tab to create a new probe or modify an existing probe. To create a new probe, click the Add icon in the upper-right corner of the tab; provide a name for the new probe in the Probe Name column. Then, select the Edit icon (located to the left of the probe name) to review or add the probe definition.

Probes Show System Probes? No

| Probe name | Collection method | Target type | Execution frequency | | Probe enabled? | Data retention |
|------------|-------------------|-------------|---------------------|---------|---|----------------|
| | | | Minutes | Seconds | | |
| | SQL | Server | 5 | 0 | <input checked="" type="checkbox"/> Yes | 1 |

General Columns Code Alternate Code

Probe name ▲

Collection method

Use the Collection method field to specify the probe type. Use the drop-down to select:

- SQL (the probe will gather information via a SQL statement)
- WMI (the probe will gather information via a Windows Management Instrumentation extension)
- Batch/Shell Script (the probe will use a command script or shell script to gather information). Please note that batch probes are platform specific. If you specify a collection method of Batch, you must specify a platform type in the Platform field.

Target type

Use the Target type drop-down to select the object type that the probe will monitor.

Execution frequency

Minutes Seconds

Probe enabled? Yes

Use the Enabled? switch to specify if the probe is enabled by default. Specify Yes to enable the probe by default, or No to specify that the probe is disabled by default.

Data retention

Use the Data retention field to specify the number of days that gathered information will be retained in the probe's history table.

Discard from history? No

Use the Discard from history field to specify if the server should create a history table for the probe. Select Yes to discard probe history, or No to retain the probe history in a table.

Platform

Use the Platform drop-down to specify the type of platform that the probe will monitor. This field is enabled only when the Collection method is Batch/Shell Script.

▲ Please specify Probe name

Fig. 22: Defining a custom probe – the General tab

Use the fields on the `General` tab to modify the definition of an existing probe or to specify the properties of a new probe:

- Use the `Probe Name` field to provide a name for a new probe.
- Use the `Collection method` field to specify the probe type. Use the drop-down listbox to select:
 - `SQL` - the probe will gather information via a SQL statement.
 - `WMI` - the probe will gather information via a Windows Management Instrumentation extension.
 - `Batch` - the probe will use a command-script or shell-script to gather information.

Before creating a batch probe on a Linux system, you must modify the `agent.cfg` file, setting the `allow_batch_probes` parameter equal to `true`, and restart the PEM agent. The `agent.cfg` file is located in one of the following directories:

- If you have installed PEM using graphical installer: `/opt/edb/pem/agent/etc/agent.cfg`
- If you have installed PEM using RPM: `/usr/edb/pem/agent/etc/agent.cfg`

On 64-bit Windows systems, agent settings are stored in the registry. Before creating a batch probe, modify the registry entry for the `AllowBatchProbes` registry entry and restart the PEM agent. PEM registry entries are located in `HKEY_LOCAL_MACHINE\Software\Wow6432Node\EnterpriseDB\PEM\agent`.

Please note that batch probes are platform-specific. If you specify a collection method of Batch, you must specify a platform type in the Platform field.

To invoke a script on a Linux system, you must modify the entry for `batch_script_user` parameter of `agent.cfg` file and specify the user that should be used to run the script. You can either specify a non-root user or root for this parameter. If you do not specify a user, or the specified user does not exist, then the script will not be executed. Restart the agent after modifying the file.

To invoke a script on a Windows system, set the registry entry for `AllowBatchJobSteps` to true and restart the PEM agent.

- Use the `Target Type` drop-down listbox to select the object type that the probe will monitor. Target type is disabled if Collection method is WMI.
- Use the `Minutes` and `Seconds` selectors to specify how often the probe will collect data.
- Use the `Probe Enable?` switch to specify if the probe is enabled by default. Specify Yes to enable the probe by default, or No to specify that the probe is disabled by default.

Note: If data from a disabled probe is used in a chart, the chart will display an information icon in the upper-left corner that allows you to enable the probe by clicking the provided link.

- Use the `Data Retention` field to specify the number of days that gathered information will be retained in the probe's history table.
- Use the switch next to `Discard from history` to specify if the server should create a history table for the probe. Select Yes to discard probe history, or No to retain the probe history in a table.
- Use the `Platform` drop-down listbox to specify the type of platform that the probe will monitor. This field is enabled only when the Collection method is Batch.

Probes Show System Probes? No

| Probe name | Collection method | Target type | Execution frequency | | Probe enabled? | Data retention |
|------------|-------------------|-------------|---------------------|---------|---|----------------|
| | | | Minutes | Seconds | | |
| | SQL | Server | 5 | 0 | <input checked="" type="checkbox"/> Yes | 1 |

General **Columns** Code Alternate Code

| Name | Internal name | Column type | Data type | Unit | Graphable? | Is PIT? | Calculate PIT? |
|------|---------------|-------------|-----------|------|---|-----------------------------|-----------------------------|
| | | Non key | numeric | | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> No |

General

Name ▲

Internal name

Column type

Use the Column Type drop-down to specify if the column is a Key column (a primary key) or a Non key column. Non-key columns are generally metric items (values that can be graphed).

Data type

Use the Data type drop-down to specify the type of data that will be stored in the column.

Unit

Unit field to specify the unit of measure that applies to the metric stored in the column. This unit is displayed on the Y-Axis of a custom chart or a Capacity Manager chart. This is an optional field.

Graphable? Yes

Set the Graphable switch to Yes to specify that the defined metric may be graphed, and that the probe should be accessible from the Capacity Manager or Manage Charts dialogs.

Is PIT? No

Set the Is PIT switch to Yes to specify that the metric is stored by point-in-time (by default). 'Point-in-time' metrics are those metrics that change (increase or decrease) at any given point of time. For example, database size is a point-in-time metric; at any given point-in-time, the size of the database is fluctuating. Metrics that are not point-in-time (also referred to as cumulative metrics) are metrics whose size always increases over time. For example, Blocks Read and Tuples Read are cumulative metrics; the value stays the same or increases.

Calculate PIT? No

Set the Calculate PIT switch to Yes to specify that the server should calculate a point-in-time value for the metric data. Calculate PIT is disabled if Is PIT is Yes.

▲ Please specify column name

▲ Please specify Probe name

Fig. 23: The Columns tab of the Custom Probes dialog

Use the Columns tab to define the columns in which the probe data will be stored. Navigate to the Columns tab, and click the Add button (in the upper-right corner) to define a new column. After providing a column name in the Name field, click the Edit button (to the left of the new column name) to provide information about the column:

- Provide a descriptive name for the column in the Name field.
- The Internal Name field is not enabled for user-defined probes.
- Use the Column Type drop-down listbox to specify if the column is a Key column (a primary key) or a Non key column. Non-key columns are generally metric items (values that can be graphed).
- Use the Data Type drop-down listbox to specify the type of data that will be stored in the column.

- Use the `Unit` field to specify the unit of measure that applies to the metric stored in the column. This unit is displayed on the Y-Axis of a custom chart or a Capacity Manager chart. This is an optional field.
- Use the `Graphable` switch to specify if the defined metric may be graphed, and that the probe should be accessible from the Capacity Manager or Manage Charts dialogs.
- Use the `Is PIT` switch to specify if the metric should be stored by point-in-time.

'Point-in-time' metrics are those metrics that change (increase or decrease) at any given point of time. For example, database size is a point-in-time metric; at any given point-in-time, the size of the database is fluctuating. Metrics that are not point-in-time (also referred to as cumulative metrics) are metrics whose size always increases over time. For example, Blocks Read and Tuples Read are cumulative metrics; the value stays the same or increases.

- Use the `Calculate PIT` switch to specify that the server should calculate a point-in-time value for the metric data. Calculate PIT is disabled if Is PIT is Yes.

PEM allows you to store point-in time-values of cumulative metrics as well. PEM subtracts the last collected value of a cumulative metric from the current value, and stores the difference as a point-in-time value.

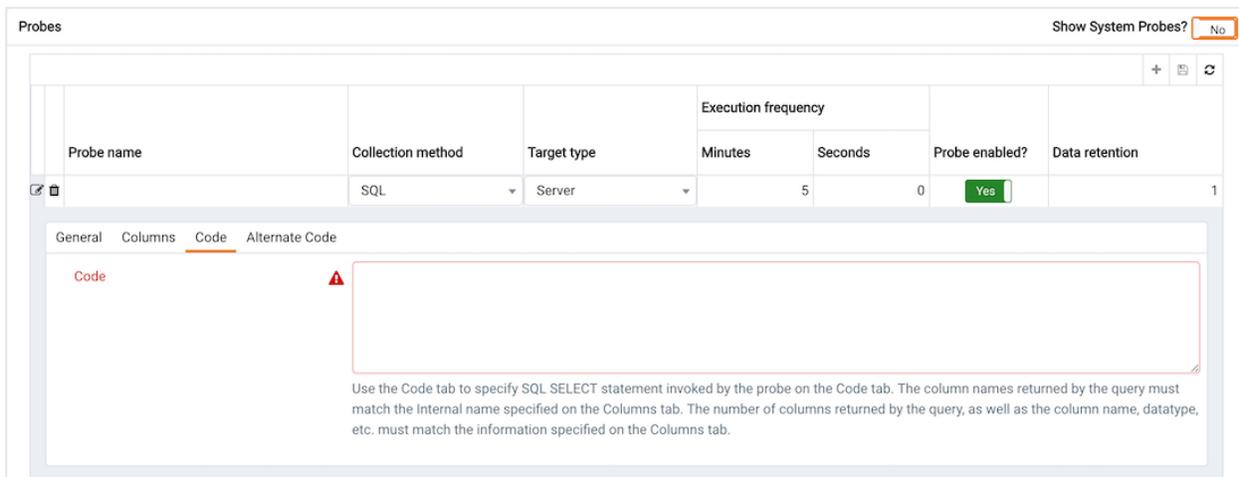


Fig. 24: The Code tab of the Custom Probes dialog

Use the `Code` tab to specify the default code that will be executed by the probe:

- If the probe is a `SQL` probe, you must specify the `SQL SELECT` statement invoked by the probe on the `Code` tab. The column names returned by the query must match the `Internal Name` specified on the `Columns` tab. The number of columns returned by the query, as well as the column name, data type, etc. must match the information specified on the `Columns` tab.
- If the probe is a batch probe, you must specify the shell or `.bat` script that will be invoked when the probe runs. The output of the script should be as follows:

The first line must contain the names of the columns provided on the `Columns` tab. Each column name should be separated by a tab (t) character. From the second line onwards, each line should contain the data for each column, separated by a tab character.

If a specified column is defined as key column, you should ensure that the script does not produce duplicate data for that column across lines of output. The number of columns specified in the `Columns` tab and their names, data type, etc. should match with the output of the script output.

- If the probe is a `WMI` probe, you must specify the `WMI` query as a `SELECT WMI` query. The column name referenced in the `SELECT` statement should be same as the name of the corresponding column specified on the

Column tab. The column names returned by the query must match the `Internal Name` specified on the **Column** tab. The number of columns returned by the query, as well as the column name, data type, etc. must match the information specified on the **Columns** tab.

The screenshot shows the 'Probes' dialog box with the 'Alternate Code' tab selected. The dialog includes a table for probe configuration and a section for alternate code. The table has the following data:

| Probe name | Collection method | Target type | Execution frequency | | Probe enabled? | Data retention |
|------------|-------------------|-------------|---------------------|---------|----------------|----------------|
| | | | Minutes | Seconds | | |
| | SQL | Server | 5 | 0 | Yes | 1 |

Below the table, the 'Alternate Code' tab contains the following text:

Move the Applies to all database server versions switch to Yes to specify that the code on the Code tab will execute for every server version. If Applies to all database server versions? is set to No, you may specify code for a specific server version below. Applies to all database server versions? is disabled when the Collection method is WMI and Batch. Do not specify the alternate probe code for a database server version to use the default code as specified in the Code Tab.

Applies to all database server versions? Yes

Below this is a table with columns 'Database version(s)' and 'Probe code'. A message below the table reads: 'No alternate code found for custom probe'.

At the bottom of the dialog, a red error bar displays the message: 'Please specify Probe name'.

Fig. 25: The Alternate Code tab of the Custom Probes dialog

Use the `Alternate Code` tab to provide code that will be invoked if the probe fires on a specific version of the server. To provide version-specific code, move the `Applies to any server version?` switch to `No`, and click the `Add` button. Then, use the `Database Version(s)` drop-down listbox to select a version, and click the `Edit` button (to the left of the version name) to provide the code that will execute when the probe fires.

If you select a database version, and leave the `Probe Code` column blank, PEM will invoke the code specified on the `Code` tab when the probe executes on a server that matches that version.

When you've finished defining the probe, click the `Save` icon (in the corner of the `Custom Probes` tab) to save the definition, and make the probe data available for use on custom charts and graphs.

4.4.2 Deleting a Probe

Use the `Delete` icon (located to the left of a probe name) to delete a user-defined probe. When you delete a probe, the probe is marked for deletion and will be deleted later (when custom probes are purged). During the deletion, the probe definition is deleted and any corresponding tables are dropped from the `pemdata` and `pemhistory` schemas.

System probes are the built-in probes provided by PEM, and are part of the PEM schema. If you attempt to delete a system probe, the PEM client will display a notice, informing you that the probe cannot be deleted.



Fig. 26: Attempting to delete a system probe

4.4.3 Copying a Probe

You can use the `Copy Probe Configuration...` dialog to copy probe definitions from one monitored object to one or more monitored objects of the same type. To open the `Copy Probe Configuration...` dialog, highlight the object from which you are copying probes in the PEM client tree control, and select `Manage Probes` from the `Management` menu. When the `Manage Probes` tab opens, click on `Copy Probe` to open the `Copy Probe Configuration` dialog:

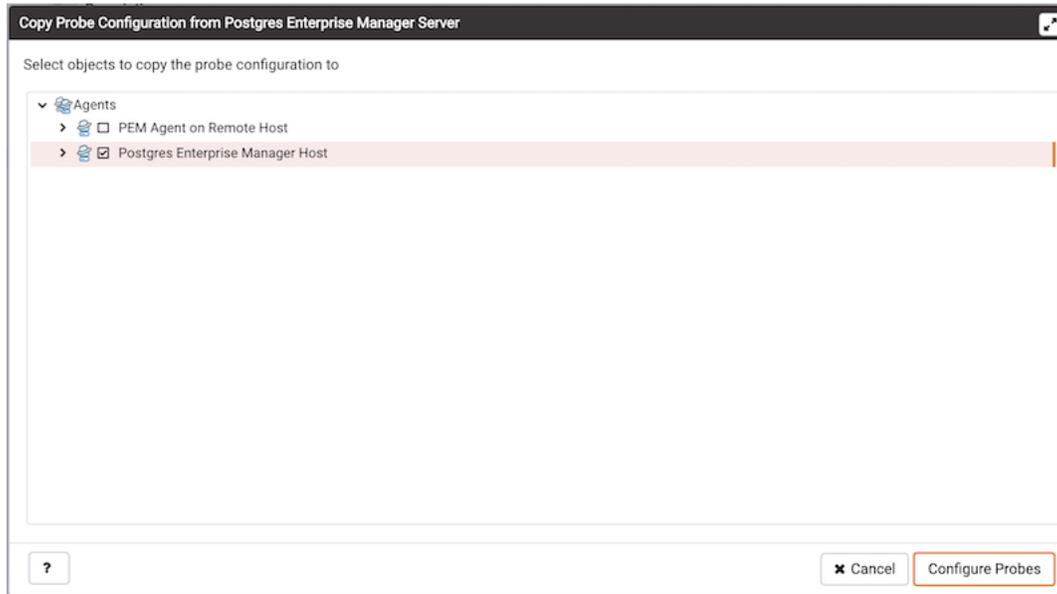


Fig. 27: The *Copy Probe Configuration tree control*

The dialog will copy the probe definitions from the object through which the `Copy Probe Configuration` dialog was opened, to the location(s) selected on the tree control.

Note that if you specify a parent node in the `Copy Probe Configuration` tree control, PEM will copy the probe configurations to each object (of the same type) that resides under that node in the tree control. For example, to copy the probe definitions from one schema to all schemas that reside within a database, select only the parent database of the target schemas. Please note that a red warning symbol is displayed to the left of the name of a listed target object if that object is the source of the probe that is being copied.

When you have selected the target object or objects, click the `Configure Probes` button to copy the probe definitions to the location selected on the dialog.

4.5 Alerting

PEM continually monitors registered servers and compares performance metrics against pre-defined and user-specified thresholds that constitute good or acceptable performance for each statistic. Any deviation from an acceptable threshold value triggers an alert. An alert is a system-defined or user-defined set of conditions that PEM compares to the system statistics. Alerts call your attention to conditions on registered servers that require your attention.

Reviewing alerts on the Global Overview

When your system statistics deviate from the boundaries specified for that statistic, the alert triggers, displaying a high (red), low (yellow), or medium (orange) severity warning in the left-most column of the `Alert Status` table on the `Global Overview` dashboard.

| Alerts Status | | | | | | | | | |
|---------------|------------|------------------------------------|--|-----------------|----------|--------|---------|--------|---------------------|
| | Alarm Type | Object Description | Alert Name | Value | Database | Schema | Package | Object | Alerting Since |
| ▶ | ● High | EDB Postgres Advanced Server 11 | Database size in server | 113 MB | | | | | 2020-04-22 11:50:00 |
| ▶ | ● High | EDB Postgres Advanced Server 11 | Last Vacuum | Never ran | | | | | 2020-04-21 21:26:54 |
| ▶ | ● High | EDB Postgres Advanced Server 11 | Last AutoVacuum | 140.21 hrs | | | | | 2020-04-22 12:04:05 |
| ▶ | ● High | EPAS_12 | Table size in server | 410 MB | | | | | 2020-04-09 15:53:51 |
| ▶ | ● Medium | EPAS_12 | Last Vacuum | 5.18 hrs | | | | | 2020-04-27 20:47:50 |
| ▶ | ● High | EPAS_12 | Database size in server | 455 MB | | | | | 2020-04-09 15:52:50 |
| ▶ | ● Medium | EPAS_12 | Last AutoVacuum | 5.16 hrs | | | | | 2020-04-27 20:47:50 |
| ▶ | ● High | N/A | Alert Errors | 3 | | | | | 2020-01-21 14:26:04 |
| ▶ | ● High | PGSQL12_Centos7_1 | Server Down | 1 | | | | | 2020-04-27 20:48:50 |
| ▶ | ● High | PGSQL12_Centos7_1 | Last Vacuum | Never ran | | | | | 2020-04-03 14:58:57 |
| ▶ | ● High | PGSQL12_Centos7_1 | Last AutoVacuum | Never ran | | | | | 2020-04-03 14:58:57 |
| ▶ | ● High | Postgres Enterprise Manager Server | Largest index by table-size percentage | 100 % | | | | | 2020-04-21 22:07:52 |
| ▶ | ● High | Postgres Enterprise Manager Server | Database size in server | 2.072265625 GB | | | | | 2020-02-05 18:26:49 |
| ▶ | ● High | Postgres Enterprise Manager Server | Table size in server | 1.9814453125 GB | | | | | 2020-02-20 11:29:45 |
| ▶ | ● Medium | Postgres Enterprise Manager Server | Connections in idle state | 12 | | | | | 2020-04-27 16:20:32 |
| ▶ | ● Medium | Postgres Enterprise Manager Server | Last Vacuum | 4.99 hrs | | | | | 2020-04-27 20:47:50 |

Fig. 28: *The Alert Status table*

The PEM server includes a number of pre-defined alerts that are actively monitoring your servers. If the alert definition makes details available about the cause of the alert, you can click the down arrow to the right of the severity warning to access a dialog with detailed information about the condition that triggered the alert.

| Alert Details (Auto-refresh paused whilst rows are expanded. ⓘ) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--------------------------|---------------|--------------------------------------|-----------------|-------|------------------------------------|----------|--------|---------|--------|---------------------|------------|-------------|---------------|----------------------|------------------|-----------|-----|------|-------------|---------|-----|-----|------------------|-----------|-----|-----|--------------|-----------|-----|-----|-----------|-----------|-----|----|
| | Ack'd | Alert Type | Name | Value | Agent | Server | Database | Schema | Package | Object | Alerting Since | | | | | | | | | | | | | | | | | | | | | | | | |
| ▶ | <input type="checkbox"/> | ● High | Table size in server | 1.9814453125 GB | | Postgres Enterprise Manager Server | | | | | 2020-02-20 11:29:45 | | | | | | | | | | | | | | | | | | | | | | | | |
| <div> <p>General Parameters</p> <table border="1"> <thead> <tr> <th>Table name</th> <th>Schema name</th> <th>Database name</th> <th>Total table size(MB)</th> </tr> </thead> <tbody> <tr> <td>table_statistics</td> <td>pehistory</td> <td>pem</td> <td>1087</td> </tr> <tr> <td>server_logs</td> <td>pepdata</td> <td>pem</td> <td>263</td> </tr> <tr> <td>index_statistics</td> <td>pehistory</td> <td>pem</td> <td>237</td> </tr> <tr> <td>session_info</td> <td>pehistory</td> <td>pem</td> <td>137</td> </tr> <tr> <td>lock_info</td> <td>pehistory</td> <td>pem</td> <td>88</td> </tr> </tbody> </table> </div> | | | | | | | | | | | | Table name | Schema name | Database name | Total table size(MB) | table_statistics | pehistory | pem | 1087 | server_logs | pepdata | pem | 263 | index_statistics | pehistory | pem | 237 | session_info | pehistory | pem | 137 | lock_info | pehistory | pem | 88 |
| Table name | Schema name | Database name | Total table size(MB) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| table_statistics | pehistory | pem | 1087 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| server_logs | pepdata | pem | 263 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| index_statistics | pehistory | pem | 237 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| session_info | pehistory | pem | 137 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| lock_info | pehistory | pem | 88 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Fig. 29: *Alert details*

PEM also provides an interface that allows you to create customized alerts. Each alert uses metrics defined on an alert template. An alert template defines how the server will evaluate the statistics for a resource or metric. The PEM server includes a number of pre-defined alert templates, or you can create custom alert templates.

4.5.1 Using the Alerts Dashboard

Use the `Dashboards` menu (on the `Monitoring` tab) to access the Alerts Dashboard. The Alerts Dashboard displays a summary of the active alerts and the status of each alert:

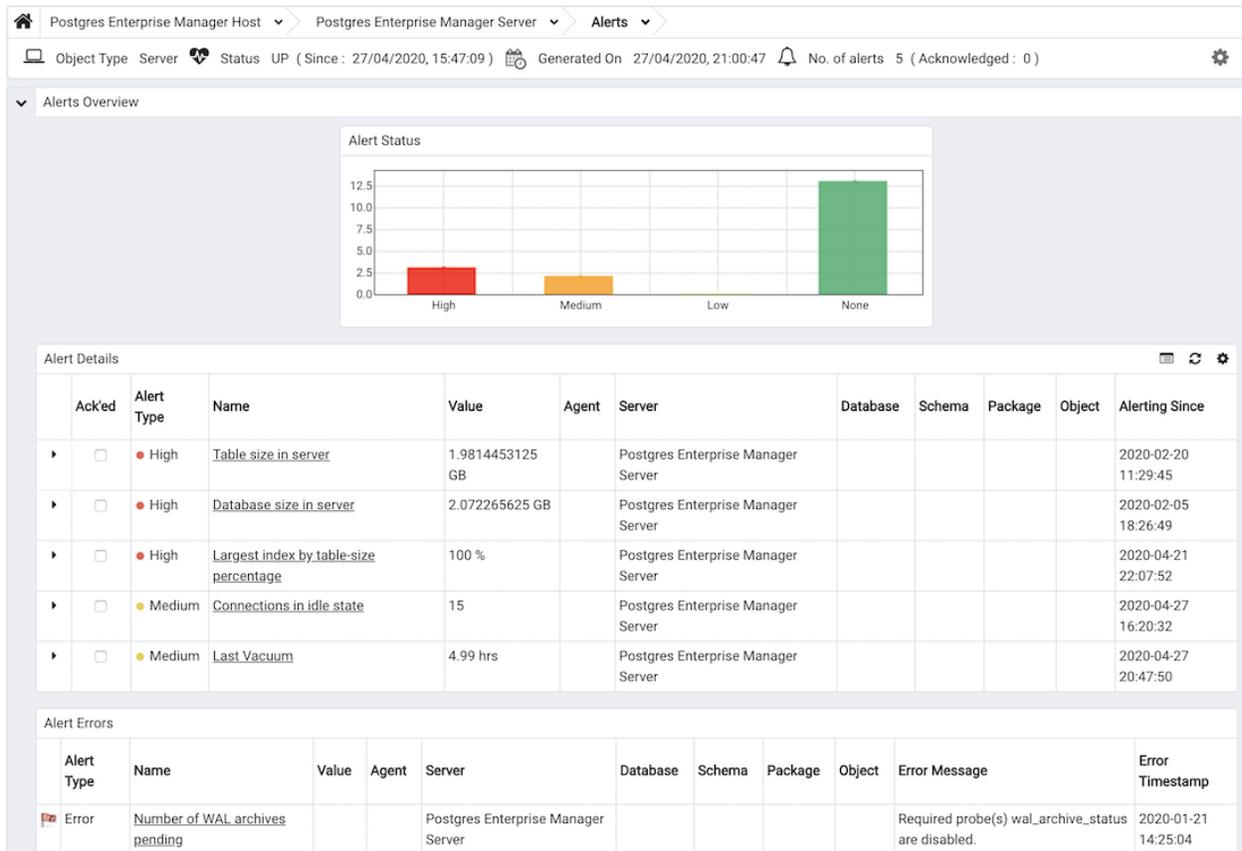


Fig. 30: The Alerts Dashboard

The Alerts Dashboard header displays the date and time that the dashboard was last updated, and the number of current alerts.

The Alerts Overview section displays a graphic representation of the active alerts, as well as a count of the current high, low and medium alerts. The vertical bar on the left of the graph provides the count of the alerts displayed in each column. Hover over a bar to display the alert count for the selected alert severity in the upper-right hand corner of the graph.

The Alert Details table provides a list of the alerts that are currently triggered. The entries are prioritized from high-severity to lower-severity; each entry includes information that will allow you to identify the alert and recognize the condition that triggered the alert. Click the name of an alert to review detailed information about the alert definition.

The Alert Errors table displays configuration-related errors (eg. accidentally disabling a required probe, or improperly configuring an alert parameter). You can use the information provided in the Error Message column to identify and resolve the conflict that is causing the error.

Customizing the Alerts Dashboard

You can customize tables and charts that appear on the Alerts dashboard. To customize a table or chart, click the Settings icon located in the upper-right corner.

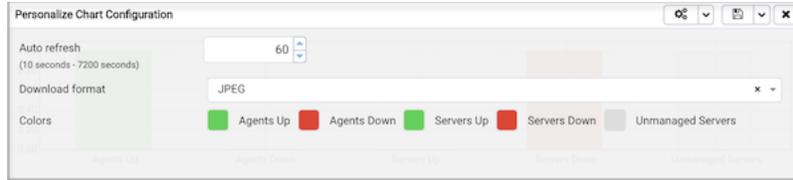


Fig. 31: Customizing a chart

Use fields on the Personalize chart configuration dialog (Figure 4.32) to provide your display preferences:

- Use the `Auto Refresh` field to specify the number of seconds between updates of the data displayed in the table or chart.
- If applicable, use the `Download as` field to indicate if you would like a chart to be downloaded as a JPEG image or a PNG image.
- If applicable, use the `Colours` selectors to specify the display colors that will be used on a chart.
- If applicable, set the `Show Acknowledged Alerts` switch to `Yes` indicate that you would like the table to display alerts that you have acknowledged with a checkbox in the `Ack'ed` column. Set the field to `No` to indicate that the table should hide any acknowledged alerts. The switch acts as a toggle; acknowledged alerts are not purged from the table content until the time specified in the alert definition passes.

To save your customizations, click the `Save` icon (a check mark) in the upper-right corner; to delete any previous changes and revert to the default values, click the `Delete` icon. The `Save` and `Delete` drop-down menus allow you to specify if your preferences should be applied to `All Dashboards`, or to a selected server or database.

4.5.2 Using the Manage Alerts Tab

Use the PEM Client's Manage Alerts tab to define, copy, or manage alerts. To open the Manage Alerts tab, select Manage Alerts from the Management menu.

| Quick Links | | | | | | | | | |
|---|--|---|--------------------------------------|--|---|---|---|--|--|
|  Copy Alerts | |  Alert Templates | |  Email Groups | |  Server Configuration | |  Help | |
| Alerts | | | | | | | | | |
| | Name | Auto created? | Template | Enable? | Interval | | History retention | | |
| | | | | | Default? | Minutes | Default? | Days | |
| <input checked="" type="checkbox"/> |  Audit config mismatch | <input type="checkbox"/> No | | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Average table bloat in server | <input checked="" type="checkbox"/> Yes | Average table bloat in server | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Connections in idle-in-transaction state | <input checked="" type="checkbox"/> Yes | Connections in idle-in-transactio... | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Connections in idle-in-transaction state, as a ... | <input checked="" type="checkbox"/> Yes | Connections in idle-in-transactio... | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Connections in idle state | <input checked="" type="checkbox"/> Yes | Connections in idle state | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Database size in server | <input checked="" type="checkbox"/> Yes | Database size in server | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Highest table bloat in server | <input checked="" type="checkbox"/> Yes | Highest table bloat in server | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Largest index by table-size percentage | <input checked="" type="checkbox"/> Yes | Largest index by table-size perc... | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Last AutoVacuum | <input checked="" type="checkbox"/> Yes | Last AutoVacuum | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Last Vacuum | <input checked="" type="checkbox"/> Yes | Last Vacuum | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Log config mismatch | <input checked="" type="checkbox"/> Yes | Log config mismatch | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Number of prepared transactions | <input checked="" type="checkbox"/> Yes | Number of prepared transactions | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Number of WAL archives pending | <input checked="" type="checkbox"/> Yes | Number of WAL archives pending | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Number of WAL files | <input checked="" type="checkbox"/> Yes | Number of WAL files | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Server Down | <input checked="" type="checkbox"/> Yes | Server Down | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Table size in server | <input checked="" type="checkbox"/> Yes | Table size in server | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Total connections | <input checked="" type="checkbox"/> Yes | Total connections | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |

Fig. 32: The Manage Alerts tab

Use the Quick Links toolbar to open dialogs and tabs that will assist you when managing alerts:

- Click Copy Alerts to open the Copy Alert Configuration dialog and copy an alert definition.
- Click Alert Templates to open the Alert Template tab, and modify or create an alert template.
- Click Email Groups to open the Email Groups tab, and modify or create an email group.
- Click Server Configurations to open the Server Configuration dialog and review or modify server configuration settings.
- Click Help to open the PEM online help in a new tab of the PEM web interface.

Use the table in the Alerts section of the Manage Alerts tab to create new alerts or manage existing alerts.

Creating a Custom Alert Template

An alert template is a prototype that defines the properties of an alert. An alert instructs the server to compare the current state of the monitored object to a threshold (specified in the alert template) to determine if a situation exists that requires administrative attention.

You can use the `Alert Templates` tab to define a custom alert template or view the definitions of existing alert templates. To open the `Alert Templates` tab, select the `Manage Alerts . . .` menu option from the Management menu. When the `Manage Alerts` tab opens, select `Alert Templates` from the Quick Links toolbar.

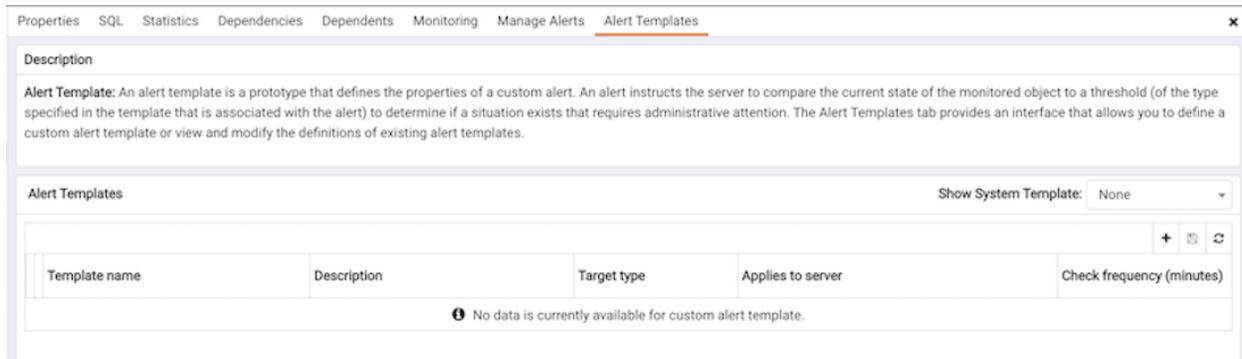


Fig. 33: *The Alert Templates tab*

Use the `Show System Template` drop-down listbox to filter the alert templates that are displayed in the `Alert Templates` table. Use the listbox to select a level of the PEM hierarchy to view all of the templates for the selected level.

Defining a New Alert Template

To define a new alert template, use the `Show System Template` drop-down listbox to select `None`, and click the `Add icon (+)` located in the upper-right corner of the alert template table. The alert template editor opens.

The screenshot shows the 'General' tab of an alert template configuration. It includes the following fields and options:

- Template name:** A text input field with a red warning icon.
- Description:** A text input field with a red warning icon.
- Target type:** A dropdown menu currently set to 'Server'. Below it is a note: 'Use the Target type field to select the type of object that will be the focus of the alert.'
- Applies to server:** A dropdown menu currently set to 'ALL'. Below it is a note: 'Use the Applies to server field to specify the server to which the alert will be applied; specify a single server type or ALL.'
- History retention:** A numeric input field set to '30'. Below it is a note: 'Use the History retention field to specify the number of days that the result of the alert execution will be stored on the PEM server.'
- Threshold unit:** An empty text input field. Below it is a note: 'Use the Threshold unit field to specify the unit type of the threshold value.'
- Auto create:** A section containing:
 - Auto create?:** A toggle switch currently set to 'No'. Below it is a note: 'Use the Auto create field to automatically create alerts using this template. Please provide default threshold values. If the value is "Yes" then all the added parameters in Parameters tab will be removed as we do not support parametrised auto alerts.'
 - Operator:** A dropdown menu currently set to '>'. To its right are three input fields labeled 'Low', 'Med', and 'High'.
- Check frequency (minutes):** A numeric input field set to '1'. Below it is a note: 'Use the Check frequency field to specify the number of minutes between alert executions. This value specifies how often the server will invoke the SQL code specified on the SQL tab and compare the result to the threshold value specified in the alert definition.'

Fig. 34: The General tab

Use fields on the `General` tab to specify general information about the template:

- Use the `Template name` field to specify a name for the new alert template.
- Use the `Description` field to provide a description of the alert template.
- Use the `Target type` drop-down listbox to select the type of object that will be the focus of the alert.
- Use the `Applies to server` drop-down listbox to specify the server type (EDB Postgres Advanced Server or PostgreSQL) to which the alert will be applied; you can specify a single server type, or `ALL`.
- Use the `History retention` field to specify the number of days that the result of the alert execution will be stored on the PEM server.
- Use the `Threshold unit` field to specify the unit type of the threshold value.
- Use fields in the `Auto create` box to indicate if PEM should use the template to generate an automatic alert. If enabled, PEM will automatically create an alert when a new server or agent (as specified by the `Target type` drop-down listbox) is added, and delete that alert when the target object is dropped.
 - Move the `Auto create?` slider to `Yes` to indicate that PEM should automatically create alerts based on the template. If you modify an existing alert template, changing the `Auto create?` slider from `No` to `Yes`, PEM will create alerts on the existing agents and servers. Please note that if you change the slider from `Yes` to `No`, the default threshold values in existing alerts will be erased, and cannot be recovered.
 - Use the `Operator` drop-down listbox to select the operator that PEM will use when evaluating the current system values.

Select a greater-than sign (>) to indicate that the alert should be triggered when the system values are greater than the values entered in the `Threshold values` fields.

Select a less-than sign (<) to indicate that the alert should be triggered when the system values are less than the values entered in the `Threshold values` fields.

- Use the threshold fields to specify the values that PEM will compare to the system values to determine if an alert should be raised. Please note that you must specify values for all three thresholds (Low, Medium, and High):

Enter a value that will trigger a low-severity alert in the `Low` field.

Enter a value that will trigger a medium-severity alert in the `Medium` field.

Enter a value that will trigger a high-severity alert in the `High` field.

- Use the `Check frequency` field to specify the default number of minutes between alert executions. This value specifies how often the server will invoke the SQL code specified in the definition and compare the result to the threshold value specified in the template.

Fig. 35: The *Probe Dependency* tab of the *Alert Templates* dialog

Use the fields on the `Probe Dependency` tab to specify the names of probes referred to in the SQL query specified on the `SQL` tab:

- Use the `Probes` drop-down listbox to select from a list of the available probes; highlight a probe name, and click the `Add` button to add the probe to the list of probes used by the alert template. To remove a probe from the selected probes list, highlight the probe name, and click the `Delete` icon.

Fig. 36: The *Parameters* tab of the *Alert Templates* dialog

- Use fields on the `Parameters` tab to define the parameters that will be used in the SQL code specified on the `SQL` tab. Click the `Add` icon (+) and:

Use the `Name` field to specify the parameter name.

Use the `Data type` drop-down listbox to specify the type of parameter.

Use the `Unit` field to specify the type of unit specified by the parameter.

- Use the `Code` field on the `SQL` tab to provide the text of the SQL query that the server will invoke when executing the alert. The SQL query will provide the result against which the threshold value is compared; if the alert result deviates from the specified threshold value, an alert will be raised.

Fig. 37: The SQL tab of the Alert Templates dialog

Within the query, parameters defined on the `Parameters` tab should be referenced sequentially by the variable `param_*x*`, where `x` indicates the position of the parameter definition within the parameter list. For example, `param_1` refers to the first parameter in the parameter list, `param_2` refers to the second parameter in the parameter list, and so on.

The query can also include the following pre-defined variables:

| Variable Description | Variable Name |
|----------------------|----------------------------------|
| agent identifier | <code>'\${agent_id}'</code> |
| server identifier | <code>'\${server_id}'</code> |
| database name | <code>'\${database_name}'</code> |
| schema name | <code>'\${schema_name}'</code> |
| Table | <code>'\${object_name}'</code> |
| index | <code>'\${object_name}'</code> |
| sequence | <code>'\${object_name}'</code> |
| function name | <code>'\${object_name}'</code> |

- Use the `Detailed Information SQL` field to provide a SQL query that will be invoked if the alert is triggered. The result set of the query may be displayed as part of the detailed alert information on the Alerts dashboard or Global Overview dashboard.

Note: If the specified query is dependent on one or more probes from different levels within the PEM hierarchy (server, database, schema, etc.), and a probe becomes disabled, any resulting alerts will be displayed as follows:

- If the alert definition and the probe referenced by the query are from the same level within the PEM hierarchy, the server will display any alerts that reference the alert template on the `Alert Error` table of the Global Alert Dashboard.
- If the alert definition and the probe referenced by the query are from different levels of the PEM hierarchy, the server will display any triggered alerts that reference the alert template on the `Alert Details` table of the hierarchy on which the alert was defined.

Click the `Save` icon to save the alert template definition and add the template name to the Alert Templates list. After saving a custom alert template, you can use the Alerting dialog to define an alert based on the template.

Modifying or Deleting an Alert Template

To view the definition of an existing template (including PEM pre-defined alert templates), use the `Show System Template` drop-down listbox to select the type of object monitored. When you select the object type, the `Alert Templates` table will display the currently defined alert templates that correspond with that object type.

Highlight a Template Name in the list, and click the Edit icon (at the left end of the row) to review the template definition.

Use the tabs on the `Alert Templates` dialog to view detailed information about the alert template:

- General information is displayed on the `General` tab.
- The names of probes that provide data for the template are listed on the `Probe Dependency` tab.
- The names of any parameters referred to in the SQL code are listed on the `Parameters` tab.
- The SQL code that defines the behavior of the alert is displayed on the `SQL` tab.

To delete an alert template, highlight the template name in the alert templates table, and click the Delete icon. The alert history will persist for the length of time specified in the `History Retention` field in the template definition.

Creating a New Alert

The `Manage Alerts` tab displays a table of alerts that are defined on the object currently selected in the PEM client tree control. You can use the `Alerts` table to modify an existing alert, or to create a new alert.

| Quick Links | | | | | | | | | |
|---|--|---|--------------------------------------|--|---|--|---|--|--|
|  Copy Alerts | |  Alert Templates | |  Email Groups | |  Server Configuration | |  Help | |
| Alerts | | | | | | | | | |
| | Name | Auto created? | Template | Enable? | Interval | | History retention | | |
| | | | | | Default? | Minutes | Default? | Days | |
| <input checked="" type="checkbox"/> |  Audit config mismatch | <input type="checkbox"/> No | | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Average table bloat in server | <input checked="" type="checkbox"/> Yes | Average table bloat in server | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Connections in idle-in-transaction state | <input checked="" type="checkbox"/> Yes | Connections in idle-in-transactio... | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Connections in idle-in-transaction state, as a ... | <input checked="" type="checkbox"/> Yes | Connections in idle-in-transactio... | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Connections in idle state | <input checked="" type="checkbox"/> Yes | Connections in idle state | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Database size in server | <input checked="" type="checkbox"/> Yes | Database size in server | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Highest table bloat in server | <input checked="" type="checkbox"/> Yes | Highest table bloat in server | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Largest index by table-size percentage | <input checked="" type="checkbox"/> Yes | Largest index by table-size perc... | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Last AutoVacuum | <input checked="" type="checkbox"/> Yes | Last AutoVacuum | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Last Vacuum | <input checked="" type="checkbox"/> Yes | Last Vacuum | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Log config mismatch | <input checked="" type="checkbox"/> Yes | Log config mismatch | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Number of prepared transactions | <input checked="" type="checkbox"/> Yes | Number of prepared transactions | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Number of WAL archives pending | <input checked="" type="checkbox"/> Yes | Number of WAL archives pending | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Number of WAL files | <input checked="" type="checkbox"/> Yes | Number of WAL files | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Server Down | <input checked="" type="checkbox"/> Yes | Server Down | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Table size in server | <input checked="" type="checkbox"/> Yes | Table size in server | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |
| <input checked="" type="checkbox"/> |  Total connections | <input checked="" type="checkbox"/> Yes | Total connections | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 1 | <input checked="" type="checkbox"/> Yes | 30 | |

Fig. 38: *The Manage Alerts tab*

To open the alert editor and create a new alert, click the Add icon (+) in the upper-right corner of the table. The editor opens as shown below.

General Notification

Name ▲

Description

Template

A template uses metrics to generate a value to which PEM compares user specified alert boundaries. If the value returned by the template function evaluates to a value that is within the boundary of a user defined alert, PEM raises an alert.

Enable? Yes
Select Yes to enable the alert, and No to disable the alert.

Interval

Default? Yes Minutes

Use fields in the Interval box to specify how often the alert should confirm that alert conditions are satisfied.

History retention

Default? Yes Days

Use fields in the History retention box to specify the number of days that PEM will store data collected by the alert.

Threshold values

Operator Low Medium High

Unit

The fields in the Threshold values box work together to define the triggering criteria for the alert.

Auto created? No

Parameter Options

| Name | Value |
|--------|------------------------------------|
| server | Postgres Enterprise Manager Server |

Fig. 39: The General tab of the alert editor

Use the fields on the `General` tab to provide information about the alert:

- Enter the name of the alert in the `Name` field.
- Use the drop-down listbox in the `Template` field to select a template for the alert. An alert template is a function that uses one (or more) metrics or parameters to generate a value to which PEM compares user-specified alert boundaries. If the value returned by the template function evaluates to a value that is within the boundary of a user-defined alert (as specified by the `Operator` and `Threshold values` fields), PEM raises an alert, adds a notice to the Alerts overview display, and performs any actions specified on the template.
- Use the `Enable?` switch to specify if the alert is enabled (Yes) or disabled (No).
- Use the controls in the `Interval` box to specify how often the alert should confirm if the alert conditions are satisfied. Use the `Minutes` selector to specify an interval value. Use the `Default` switch to set or reset the `Minutes` value to the default (recommended) value for the selected template.
- Use controls in the `History retention` box to specify the number of days that PEM will store data collected by the alert. Use the `Days` selector to specify the number of days that the data will be stored. Use the `Default` switch to set or reset the `Days` value to the default value (30 days).
- Use controls in the `Threshold values` box to define the triggering criteria for the alert. When the value specified in the `Threshold Values` fields evaluates to greater-than or less-than the system value (as specified with the `Operator`), PEM will raise a Low, Medium or High level alert:
- Use the `Operator` drop-down listbox to select the operator that PEM will use when evaluating the current

system values:

- Select a greater-than sign (>) to indicate that the alert should be triggered when the system values are greater than the values entered in the Threshold values fields.
- Select a less-than sign (<) to indicate that the alert should be triggered when the system values are less than the values entered in the Threshold values fields.
- Use the `threshold` fields to specify the values that PEM will compare to the system values to determine if an alert should be raised. Please note that you must specify values for all three thresholds (Low, Medium, and High):
 - Enter a value that will trigger a low-severity alert in the `Low` field.
 - Enter a value that will trigger a medium-severity alert in the `Medium` field.
 - Enter a value that will trigger a high-severity alert in the `High` field.

The `Parameter Options` table contains a list of parameters that are required by the selected template; the table displays both pre-defined parameters, and parameters for which you must specify a value. Please note that you must specify a value for any parameter that displays a prompt in the `Value` column.

PEM can send a notification or execute a script if an alert is triggered, or if an alert is cleared. Use the `Notification` tab to specify how PEM will behave if an alert is raised.

General **Notification**

Email notification

All alerts? No
<Default>

Low alerts? No
<Default>

Medium alerts? No
<Default>

High alerts? No
<Default>

To configure notifications for an alert, use the fields in the Email notification box to specify the user or user group that will receive an email notification if the alert is triggered at the specified level. Use the drop-down listbox to select a pre-defined group that will be sent a notification if an alert of the selected level is triggered. Please note that you must configure the PEM Server to use an SMTP server to deliver email before PEM can send email notifications.

Trap notification

Send trap? No SNMP version v3 Low alert? No

Medium alert? No High alert? No

Use the Trap notification options to configure trap notifications for this alert. Note that you must configure the PEM Server to send notifications to an SNMP trap/notification receiver before notifications can be sent.

Nagios notification

Submit passive service check result to Nagios? No

Set "Submit passive service check result to Nagios" to "Yes" to instruct the PEM server to notify Nagios when the alert is triggered or cleared.

Script execution

Execute script? No Execute on alert cleared? No

Execute script on PEM Server Monitored Server

Code

Use the fields in the Script execution box to (optionally) define a script that will be executed if an alert is triggered, and to specify details about the script execution.

- Set the Execute script slider to Yes to instruct PEM to execute the provided script if an alert is triggered.
- Set the Execute on alert cleared slider to Yes to instruct PEM to execute the provided script when the situation that triggered the alert has been resolved.
- Use the selector to indicate if the script should execute on the PEM Server or the Monitored Server.
- Provide the script that PEM should execute in the Code field. You can provide a batch/shell script, or SQL code. Within the script you can use the placeholders to replace the following:
 - %AlertName% - the name of the triggered alert.
 - %ObjectName% - the name of the server or agent on which the alert was triggered.
 - %ThresholdValue% - the threshold value reached by the metric when the alert triggered.
 - %CurrentValue% - the current value of the metric that triggered the alert.
 - %CurrentState% - the current state of the alert.
 - %OldState% - the previous state of the alert.
 - %AlertRaisedTime% - the time that the alert was raised, or the most recent time that the alert state was changed.

Fig. 40: The alert editor Notification tab

Use the fields in the Email notification box to specify the email group that will receive an email notification if the alert is triggered at the specified level. Use the Email Groups tab to create an email group that contains the address of the user or users that will be notified when an alert is triggered. To access the Email Groups tab, click the Email Groups icon located in the Quick Links menu of the Manage Alerts tab.

- To instruct PEM to send an email when a specific alert level is reached, set the slider next to an alert level to

Yes, and use the drop-down listbox to select the pre-defined user or group that will be notified.

Please note that you must configure the PEM Server to use an SMTP server to deliver email before PEM can send email notifications.

Use the `Trap` notification options to configure trap notifications for this alert:

- Set the `Send trap` slider to `Yes` to send SNMP trap notifications when the state of this alert changes.
- Set the `SNMP Ver` to `v1`, `v2`, or `v3` to identify the SNMP version.
- Use the `Low alert`, `Med alert` and `High alert` sliders to select the level(s) of alert that will trigger the trap. For example, if you set the slider next to `High alert` to `Yes`, PEM will send a notification when an alert with a high severity level is triggered.

Please note that you must configure the PEM Server to send notifications to an SNMP trap/notification receiver before notifications can be sent. For sending SNMP v3 traps, `pemAgent` will use 'User Security Model(USM)' which is in charge of authenticating, encrypting, and decrypting SNMP packets.

Also note while sending SNMP v3 traps, agent will create `snmp_boot_counter` file. This file will get created in location mentioned by `batch_script_dir` parameter in `agent.cfg`, if this parameter is not configured or if directory is not accessible due to authentication restrictions then in operating systems temporary directory, if that is also not possible then in user's home directory.

Use the field in the `Nagios notification` box to instruct the PEM server to notify Nagios network-alerting software when the alert is triggered or cleared.

- Set the `Submit passive service check result to Nagios` switch to `Yes` to instruct the PEM server to notify Nagios when the alert is triggered or cleared.

Use the fields in the `Script execution` box to (optionally) define a script that will be executed if an alert is triggered, and to specify details about the script execution.

- Set the `Execute script` slider to `Yes` to instruct PEM to execute the provided script if an alert is triggered.
- Set the `Execute on alert cleared` slider to `Yes` to instruct PEM to execute the provided script when the situation that triggered the alert has been resolved.
- Use the radio buttons next to `Execute script on` to indicate that the script should execute on the PEM Server or the Monitored Server.
- Provide the script that PEM should execute in the `Code` field. You can provide a batch/shell script, or SQL code. Within the script, you can use placeholders for the following:

`%AlertName%` - this placeholder will be replaced with the name of the triggered alert.

`%ObjectName%` - this placeholder will be replaced with the name of the server or agent on which the alert was triggered.

`%ThresholdValue%` - this placeholder will be replaced with the threshold value reached by the metric when the alert triggered.

`%CurrentValue%` - this placeholder will be replaced with the current value of the metric that triggered the alert.

`%CurrentState%` - this placeholder will be replaced with the current state of the alert.

`%OldState%` - this placeholder will be replaced with the previous state of the alert.

`%AlertRaisedTime%` - this placeholder will be replaced with the time that the alert was raised, or the most recent time that the alert state was changed.

To invoke a script on a Linux system, you must modify the entry for `batch_script_user` parameter of `agent.cfg` file and specify the user that should be used to run the script. You can either specify a non-root user or root

for this parameter. If you do not specify a user, or the specified user does not exist, then the script will not be executed. Restart the agent after modifying the file.

To invoke a script on a Windows system, set the registry entry for *AllowBatchJobSteps* to true and restart the PEM agent. PEM registry entries are located in HKEY_LOCAL_MACHINE/Software/Wow6432Node/EnterpriseDB/PEM/agent.

When you have defined the alert attributes, click the edit icon to close the alert definition editor, and then the save icon (in the upper-right corner of the Alerts table). To discard your changes, click the refresh icon; a popup will ask you to confirm that you wish to discard the changes.

Modifying or Deleting an Alert

Use the `Alerts` table to manage an existing alert or create a new alert. Highlight an object in the PEM client tree control to view the alerts that monitor that object.

| Alerts | | | | | | | | | |
|-------------------------------------|--|-------------------------------------|--------------------------------------|-------------------------------------|-------------------------------------|---------|-------------------------------------|------|------|
| | Name | Auto created? | Template | Enable? | Interval | | History retention | | Days |
| | | | | | Default? | Minutes | Default? | Days | |
| <input checked="" type="checkbox"/> | Audit config mismatch | <input checked="" type="checkbox"/> | Audit config mismatch | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 1 | <input checked="" type="checkbox"/> | 30 | |
| <input checked="" type="checkbox"/> | Average table bloat in server | <input checked="" type="checkbox"/> | Average table bloat in server | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 1 | <input checked="" type="checkbox"/> | 30 | |
| <input checked="" type="checkbox"/> | Connections in idle-in-transaction state | <input checked="" type="checkbox"/> | Connections in idle-in-transactio... | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 1 | <input checked="" type="checkbox"/> | 30 | |
| <input checked="" type="checkbox"/> | Connections in idle-in-transaction state, as a ... | <input checked="" type="checkbox"/> | Connections in idle-in-transactio... | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 1 | <input checked="" type="checkbox"/> | 30 | |
| <input checked="" type="checkbox"/> | Connections in idle state | <input checked="" type="checkbox"/> | Connections in idle state | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 1 | <input checked="" type="checkbox"/> | 30 | |
| <input checked="" type="checkbox"/> | Database size in server | <input checked="" type="checkbox"/> | Database size in server | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 1 | <input checked="" type="checkbox"/> | 30 | |
| <input checked="" type="checkbox"/> | Highest table bloat in server | <input checked="" type="checkbox"/> | Highest table bloat in server | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 1 | <input checked="" type="checkbox"/> | 30 | |
| <input checked="" type="checkbox"/> | Largest index by table-size percentage | <input checked="" type="checkbox"/> | Largest index by table-size perc... | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 1 | <input checked="" type="checkbox"/> | 30 | |
| <input checked="" type="checkbox"/> | Last AutoVacuum | <input checked="" type="checkbox"/> | Last AutoVacuum | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 1 | <input checked="" type="checkbox"/> | 30 | |
| <input checked="" type="checkbox"/> | Last Vacuum | <input checked="" type="checkbox"/> | Last Vacuum | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 1 | <input checked="" type="checkbox"/> | 30 | |
| <input checked="" type="checkbox"/> | Log config mismatch | <input checked="" type="checkbox"/> | Log config mismatch | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 1 | <input checked="" type="checkbox"/> | 30 | |
| <input checked="" type="checkbox"/> | Number of prepared transactions | <input checked="" type="checkbox"/> | Number of prepared transactions | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 1 | <input checked="" type="checkbox"/> | 30 | |
| <input checked="" type="checkbox"/> | Number of WAL archives pending | <input checked="" type="checkbox"/> | Number of WAL archives pending | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 1 | <input checked="" type="checkbox"/> | 30 | |
| <input checked="" type="checkbox"/> | Number of WAL files | <input checked="" type="checkbox"/> | Number of WAL files | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 1 | <input checked="" type="checkbox"/> | 30 | |
| <input checked="" type="checkbox"/> | Server Down | <input checked="" type="checkbox"/> | Server Down | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 1 | <input checked="" type="checkbox"/> | 30 | |
| <input checked="" type="checkbox"/> | Table_Size_Alerts | <input type="checkbox"/> | Table size in server | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 1 | <input checked="" type="checkbox"/> | 30 | |
| <input checked="" type="checkbox"/> | Table size in server | <input checked="" type="checkbox"/> | Table size in server | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 1 | <input checked="" type="checkbox"/> | 30 | |
| <input checked="" type="checkbox"/> | Total connections | <input checked="" type="checkbox"/> | Total connections | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 1 | <input checked="" type="checkbox"/> | 30 | |
| <input checked="" type="checkbox"/> | Total connections as percentage of max_con... | <input checked="" type="checkbox"/> | Total connections as percentag... | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 1 | <input checked="" type="checkbox"/> | 30 | |
| <input checked="" type="checkbox"/> | Total table bloat in server | <input checked="" type="checkbox"/> | Total table bloat in server | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 1 | <input checked="" type="checkbox"/> | 30 | |

Fig. 41: *The Alerts table*

You can modify some properties of an alert in the `Alerts` table:

- The `Alert name` column displays the name of the alert; to change the alert name, simply replace the name in the table, and click the save icon.
- The `Alert template` column displays the name of the alert template that specifies properties used by the alert. You can use the drop-down listbox to change the alert template associated with an alert.
- Use the `Alert enable?` switch to specify if an alert is enabled (Yes) or disabled (No).
- Use the `Interval` column to specify how often PEM should check to see if the alert conditions are satisfied. Set the `Default` switch to `No` and specify an alternate value (in `Minutes`), or return the `Default` switch to `Yes` to reset the value to its default setting. By default, PEM will check the status of each alert once every minute.
- Use the `History retention` field to specify the number of days that PEM will store data collected by the alert. Set the `Default` switch to `No` and specify an alternate value (in `Days`), or return the `Default` switch to `Yes` to reset the value to its default setting. By default, PEM will recommend storing historical data for 30 days.

After modifying an alert, click the save icon (located in the upper-right corner of the table) to make your changes persistent.

Click the edit icon to the left of an alert name to open an editor that provides access to the complete alert definition to modify other alert attributes.

Alert Details (Auto-refresh paused whilst rows are expanded. ⓘ)

| Ack'd | Alert Type | Name | Value | Agent | Server | Database | Schema | Package | Object | Alerting Since |
|--------------------------|------------|----------------------|-----------------|-------|------------------------------------|----------|--------|---------|--------|---------------------|
| <input type="checkbox"/> | High | Table size in server | 1.9814453125 GB | | Postgres Enterprise Manager Server | | | | | 2020-02-20 11:29:45 |

General Parameters

| Table name | Schema name | Database name | Total table size(MB) |
|------------------|-------------|---------------|----------------------|
| table_statistics | pehistory | peh | 1087 |
| server_logs | pepdata | peh | 263 |
| index_statistics | pehistory | peh | 237 |
| session_info | pehistory | peh | 137 |
| lock_info | pehistory | peh | 88 |

Fig. 42: The Alert details dialog

Use fields on the Alert details dialog to modify the definition of the selected alert. When you've finished modifying the alert definition, click **Save** to preserve your changes, or **Cancel** to exit the dialog without saving any changes.

Deleting an Alert

To mark an alert for deletion, highlight the alert name in the Alerts table and click the delete icon to the left of the name; the alert will remain in the list, but in red strike-through font.

Alerts

| | Name | Auto created? | Template | Enable? | Interval | | History retention | | |
|-------------------------------------|--|------------------------------|--------------------------------------|------------------------------|------------------------------|---------|-------------------|------------------------------|---------------|
| | | | | | Default? | Minutes | Default? | Days | |
| <input checked="" type="checkbox"/> | Audit config mismatch | <input type="checkbox"/> Yes | Audit config mismatch | <input type="checkbox"/> Yes | <input type="checkbox"/> Yes | | 1 | <input type="checkbox"/> Yes | 30 |
| <input checked="" type="checkbox"/> | Average table bloat in server | <input type="checkbox"/> Yes | Average table bloat in server | <input type="checkbox"/> Yes | <input type="checkbox"/> Yes | | 1 | <input type="checkbox"/> Yes | 30 |
| <input checked="" type="checkbox"/> | Connections in idle-in-transaction state | <input type="checkbox"/> Yes | Connections in idle-in-transactio... | <input type="checkbox"/> Yes | <input type="checkbox"/> Yes | | 1 | <input type="checkbox"/> Yes | 30 |
| <input checked="" type="checkbox"/> | Connections in idle-in-transaction state, as a ... | <input type="checkbox"/> Yes | Connections in idle-in-transactio... | <input type="checkbox"/> Yes | <input type="checkbox"/> Yes | | 1 | <input type="checkbox"/> Yes | 30 |
| <input checked="" type="checkbox"/> | Connections in idle state | <input type="checkbox"/> Yes | Connections in idle state | <input type="checkbox"/> Yes | <input type="checkbox"/> Yes | | 1 | <input type="checkbox"/> Yes | 30 |
| <input checked="" type="checkbox"/> | Database size in server | <input type="checkbox"/> Yes | Database size in server | <input type="checkbox"/> Yes | <input type="checkbox"/> Yes | | 1 | <input type="checkbox"/> Yes | 30 |
| <input checked="" type="checkbox"/> | Highest table bloat in server | <input type="checkbox"/> Yes | Highest table bloat in server | <input type="checkbox"/> Yes | <input type="checkbox"/> Yes | | 1 | <input type="checkbox"/> Yes | 30 |
| <input checked="" type="checkbox"/> | Largest index by table-size percentage | <input type="checkbox"/> Yes | Largest index by table-size perc... | <input type="checkbox"/> Yes | <input type="checkbox"/> Yes | | 1 | <input type="checkbox"/> Yes | 30 |
| <input checked="" type="checkbox"/> | Last AutoVacuum | <input type="checkbox"/> Yes | Last AutoVacuum | <input type="checkbox"/> Yes | <input type="checkbox"/> Yes | | 1 | <input type="checkbox"/> Yes | 30 |
| <input checked="" type="checkbox"/> | Last Vacuum | <input type="checkbox"/> Yes | Last Vacuum | <input type="checkbox"/> Yes | <input type="checkbox"/> Yes | | 1 | <input type="checkbox"/> Yes | 30 |
| <input checked="" type="checkbox"/> | Log config mismatch | <input type="checkbox"/> Yes | Log config mismatch | <input type="checkbox"/> Yes | <input type="checkbox"/> Yes | | 1 | <input type="checkbox"/> Yes | 30 |
| <input checked="" type="checkbox"/> | Number of prepared transactions | <input type="checkbox"/> Yes | Number of prepared transactions | <input type="checkbox"/> Yes | <input type="checkbox"/> Yes | | 1 | <input type="checkbox"/> Yes | 30 |
| <input checked="" type="checkbox"/> | Number of WAL archives pending | <input type="checkbox"/> Yes | Number of WAL archives pending | <input type="checkbox"/> Yes | <input type="checkbox"/> Yes | | 1 | <input type="checkbox"/> Yes | 30 |
| <input checked="" type="checkbox"/> | Number of WAL files | <input type="checkbox"/> Yes | Number of WAL files | <input type="checkbox"/> Yes | <input type="checkbox"/> Yes | | 1 | <input type="checkbox"/> Yes | 30 |
| <input checked="" type="checkbox"/> | Server Down | <input type="checkbox"/> Yes | Server Down | <input type="checkbox"/> Yes | <input type="checkbox"/> Yes | | 1 | <input type="checkbox"/> Yes | 30 |
| <input checked="" type="checkbox"/> | Table_Size_Alerts | <input type="checkbox"/> No | Table-size-in-server | <input type="checkbox"/> Yes | <input type="checkbox"/> Yes | | 1 | <input type="checkbox"/> Yes | 30 |
| <input checked="" type="checkbox"/> | Table size in server | <input type="checkbox"/> Yes | Table size in server | <input type="checkbox"/> Yes | <input type="checkbox"/> Yes | | 1 | <input type="checkbox"/> Yes | 30 |
| <input checked="" type="checkbox"/> | Total connections | <input type="checkbox"/> Yes | Total connections | <input type="checkbox"/> Yes | <input type="checkbox"/> Yes | | 1 | <input type="checkbox"/> Yes | 30 |
| <input checked="" type="checkbox"/> | Total connections as percentage of max_con... | <input type="checkbox"/> Yes | Total connections as percentag... | <input type="checkbox"/> Yes | <input type="checkbox"/> Yes | | 1 | <input type="checkbox"/> Yes | 30 |
| <input checked="" type="checkbox"/> | Total table bloat in server | <input type="checkbox"/> Yes | Total table bloat in server | <input type="checkbox"/> Yes | <input type="checkbox"/> Yes | | 1 | <input type="checkbox"/> Yes | 30 |

Fig. 43: Deleting an alert

The delete icon acts as a toggle; you can undo the deletion by clicking the delete icon a second time; when you click the Save icon, the alert definition will be permanently deleted.

Copying an Alert

To speed up the deployment of alerts in the PEM system, you can copy alert definitions from one object to one or more target objects.

To copy alerts from an object, highlight the object in the PEM client tree control on the main PEM window, and select the `Copy Alerts...` option from the `Management` menu. When the `Manage Alerts` tab opens, click the `Copy Alerts` icon (located in the `Quick Links` toolbar) to open the `Copy Alert Configuration` dialog.

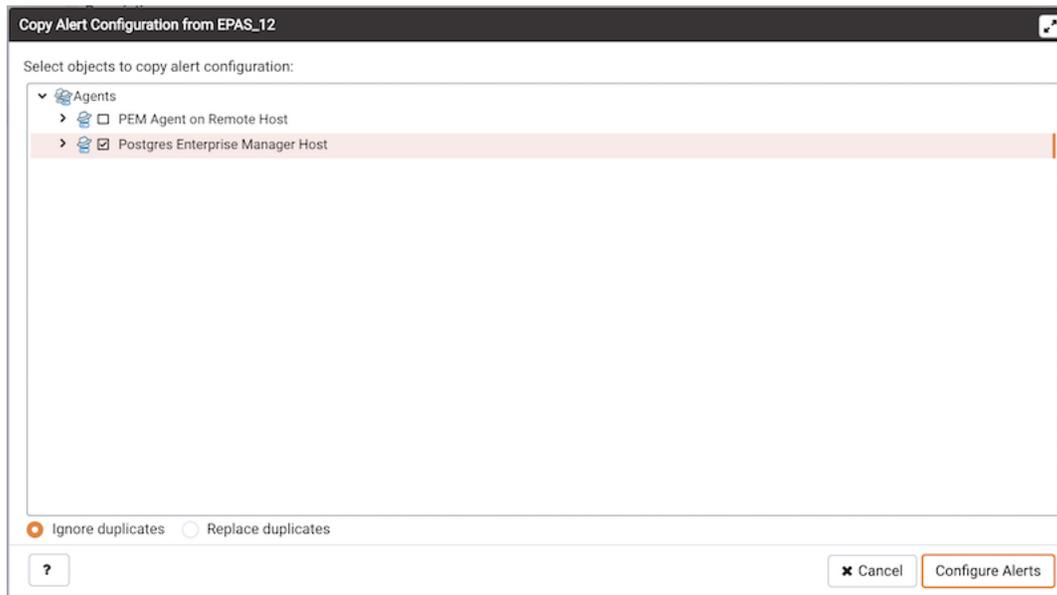


Fig. 44: *The Copy Alert Configuration dialog*

The `Copy Alert Configuration` dialog copies all alerts from the object highlighted in the PEM client tree control to the object or objects selected on the dialog. Expand the tree control to select a node or nodes to specify the target object(s). The tree control displays a red warning indicator next to the source object.

To copy alerts to multiple objects at once, select a parent node of the target(s). For example, to copy the alerts from one table to all tables in a schema, you can simply select the checkbox next to the schema. PEM will only copy alerts to targets that are of the same type as the source object.

Check the `Ignore duplicates` radio button to prevent PEM from updating any existing alerts on the target objects with the same name as those being copied. Use the `Replace duplicates` option to replace existing alerts with alerts of the same name from the source object.

Click the `Configure Alerts` button to proceed to copy the alerts from the source object to all objects of the same type in, or under those objects selected on the `Copy Alert Configuration` dialog.

Audit Log Alerting

PEM provides alert templates that allow you to use the `Alerting` dialog to create an alert that will trigger when an `ERROR` or `WARNING` statement is written to a log file for a specific server or agent. To open the `Alerting` dialog, highlight the name of the server or agent in the PEM client Object browser tree control, and select `Alerting...` from the `Management` menu.

To create an alert that will notify you of `ERROR` or `WARNING` messages in the log file for a specific server, create an alert that uses one of the following alert templates:

- Number of `ERRORS` in the logfile on server `M` in last `X` hours

- Number of `WARNINGS` in the logfile on server `M` in last `X` hours

- Number of `ERRORS` or `WARNINGS` in the logfile on server `M` in last `X` hours

To create an alert that will notify you of `ERROR` or `WARNING` messages for a specific agent, create an alert that uses one of the following alert templates:

- Number of `ERRORS` in the logfile on agent `M` in last `X` hours

- Number of `WARNINGS` in the logfile on agent `M` in last `X` hours

- Number of `ERRORS` or `WARNINGS` in the logfile on agent `M` in last `X` hours

Please note that this functionality is supported only on Advanced Server.

Creating an Email Group

Postgres Enterprise Manager monitors your system for conditions that require user attention. You can use an email group to specify the email addresses of users that the server will notify if current values deviate from threshold values specified in an alert definition. An email group has the flexibility to notify multiple users, or target specific users during user-defined time periods.

Please note that you must configure the PEM Server to use an SMTP server to deliver email before PEM can send email notifications.

Use the `Email Groups` tab to configure groups of SMTP email recipients. To access the `Email Groups` tab, select `Manage Alerts...` from the PEM client's `Management` menu; when the `Manage Alerts` tab opens, select `Email Groups` from the `Quick Links` toolbar.



Fig. 45: *The Email Groups tab*

The `Email Groups` tab displays a list of the currently defined email groups. Highlight a group name and click the `Edit` icon (at the far left end of the row) to modify an existing group.

To define a new email group, click the `Add` icon (+) in the upper-right corner of the `Email Groups` table. The `Email Group` definition dialog opens.

Email Groups

| Group Name |
|------------|
| <Default> |
| sales |

Email Group

Group Name: sales

Email group options specify email notifications will be delivered to a specific group member (or members) during a selected time period.

- To addresses:** Enter a comma-delimited list of recipient addresses in the To addresses field.
- Reply to addresses:** Enter a comma-delimited list of recipient addresses in the Reply to addresses field.
- CC addresses:** Enter a comma-delimited list of addresses that will receive a copy of the email in the CC addresses field.
- BCC addresses:** Enter a comma-delimited list of addresses that will receive a copy of the email (without the knowledge of other recipients) in the BCC addresses field.
- From address:** Enter the email address that messages to this group should be sent from in the From address field.
- Subject prefix:** Enter the email subject prefix to this group in the Subject prefix field.
- From time/To time(HH:MM:SS):** Use the From time and To time hour selectors to select a time range for a group member (or members). When a notification is sent, the server will evaluate the times specified within the group list and send the message to those members whose group entries include the current time. Provide the From time and To time values in the locale of the PEM client host, and the PEM server will translate the time into other time zones as required.

| To addresses | From address | From time | To time |
|------------------------|-------------------------------------|-----------|----------|
| sales@enterprisedb.com | firstname.lastname@enterprisedb.com | 00:00:00 | 23:59:59 |

Options

To addresses: sales@enterprisedb.com

Reply to addresses:

CC addresses:

BCC addresses:

From address: firstname.lastname@enterprisedb.com

Subject prefix:

From time: 00:00:00

To time: 23:59:59

Fig. 46: Adding an email group

Use the Email Group dialog to define an email group and its members:

- Provide a name for the email group in the Group Name field.

Each row within the email group definition will associate a unique set of email addresses with a specific time period. When an alert is triggered, the server will evaluate the times specified in each row and send the message to those group members whose definitions are associated with the time that the alert triggered.

Click the Add icon (+) in the group members table to open the Options tab, and add the member addresses that will receive notifications for the time period specified:

- Enter a comma-delimited list of recipient addresses in the Reply to Addresses field.
- Enter a comma-delimited list of addresses that will receive a copy of the email in the CC Addresses field.
- Enter a comma-delimited list of addresses that will receive a copy of the email (without the knowledge of other recipients) in the Bcc Addresses field.
- Enter the email address that messages to this group should be sent from in the From Address field.

- Use the `Subject prefix` field to provide a message that will be added to the start of each subject line when a notification is sent.
- Use the `From Time` and `To Time` time selectors to specify the time range for notifications to the group member(s) that are identified on this row. Provide the `From Time` and `To Time` values in the locale of the PEM client host, and the PEM server will translate the time into other time zones as required.

When you've identified the member or members that will receive an email during a specific time period, click the `Add` icon to add a row to the table, and specify another time period and the email addresses that will be notified during those hours. When you've finished defining the email group, click the `Save` icon.

To delete an email group, highlight the name of the group in the `Email Group` table and click the `Delete` icon (located to the left of the group name).



Fig. 47: *Deleting an email group*

The group name will be displayed in the `Email Group` table in red; click the `Save` icon to make the change persistent and remove the group from the table.

After creating the email group, you can use the `Manage Alerts` tab to set up the `Notification` details for an alert that will direct notifications to the group.

4.5.3 Using PEM with Nagios

The PEM server can send a passive alert result to Nagios network-alerting software when a user-defined alert is triggered. To instruct the PEM server to notify Nagios of a triggered alert, you must:

- Enable Nagios notification for each alert that will trigger a notification from the PEM server to Nagios. Please note that PEM alerting must be configured before you create the `host.cfg` file, the `services.cfg` file, or configure Nagios.
- Configure Nagios-related behaviors of the PEM server.
- Create the `host.cfg` and `services.cfg` configuration files.
- If necessary, modify the Nagios configuration file and restart the server.

After configuring the server to enable Nagios alerting, any triggered alerts will send a passive check result to the Nagios service. The syntax of a passive alert is:

```
<timestamp> PROCESS_SERVICE_CHECK_RESULT; <host_name> ;
<service_name> ; <service_status> ;
```

Where:

`timestamp` is the date and time that the alert was triggered.

`host_name` is the name of the server or agent.

`service_name` is the name of the alert.

`service_status` is the numeric service status value:

- 0 if the service status is OK
- 1 if the service status is WARNING
- 2 if the service status is CRITICAL
- 3 if the service status is UNKNOWN

The PEM server uses the following rules to evaluate the service status:

- If the PEM alert level is `CLEARED`, the warning message will read `OK`.
- If the PEM alert level is `LOW`, the warning message will read `WARNING`.
- If the `is_nagios_medium_alert_as_critical` flag (specified in the PEM server configuration dialog) is set to `FALSE` and the alert level `MEDIUM`, the warning message will read `WARNING`.
- If the `is_nagios_medium_alert_as_critical` flag (specified in the PEM server configuration dialog) is set to `TRUE` and the alert level is `MEDIUM`, the warning message will read `CRITICAL`.
- If the PEM alert level is `HIGH`, the warning message will read `CRITICAL`.

Enabling Nagios Notification for an Alert

The PEM server maintains a unique set of notification properties for each enabled alert. Use the `Notification` tab of the `Manage Alerts` tab to specify that (when triggered), a given alert will send an alert notice to Nagios.

To modify the notification properties of an alert, right-click on the name of the object monitored by the alert, and select `Manage Alerts...` from the `Management` menu. When the `Manage Alerts` tab opens, locate the alert, and then click the edit button to the left of the alert name in the `Alerts` list. When the edit pane opens, select the `Notification` tab.

General **Notification**

Email notification

All alerts? No
 <Default>

Low alerts? No
 <Default>

Medium alerts? No
 <Default>

High alerts? No
 <Default>

To configure notifications for an alert, use the fields in the Email notification box to specify the user or user group that will receive an email notification if the alert is triggered at the specified level. Use the drop-down listbox to select a pre-defined group that will be sent a notification if an alert of the selected level is triggered. Please note that you must configure the PEM Server to use an SMTP server to deliver email before PEM can send email notifications.

Trap notification

Send trap? No SNMP version v3 Low alert? No

Medium alert? No High alert? No

Use the Trap notification options to configure trap notifications for this alert. Note that you must configure the PEM Server to send notifications to an SNMP trap/notification receiver before notifications can be sent.

Nagios notification

Submit passive service check result to Nagios? Yes

Set "Submit passive service check result to Nagios" to "Yes" to instruct the PEM server to notify Nagios when the alert is triggered or cleared.

Script execution

Execute script? No Execute on alert cleared? No

Execute script on PEM Server Monitored Server

Code

Use the fields in the Script execution box to (optionally) define a script that will be executed if an alert is triggered, and to specify details about the script execution.

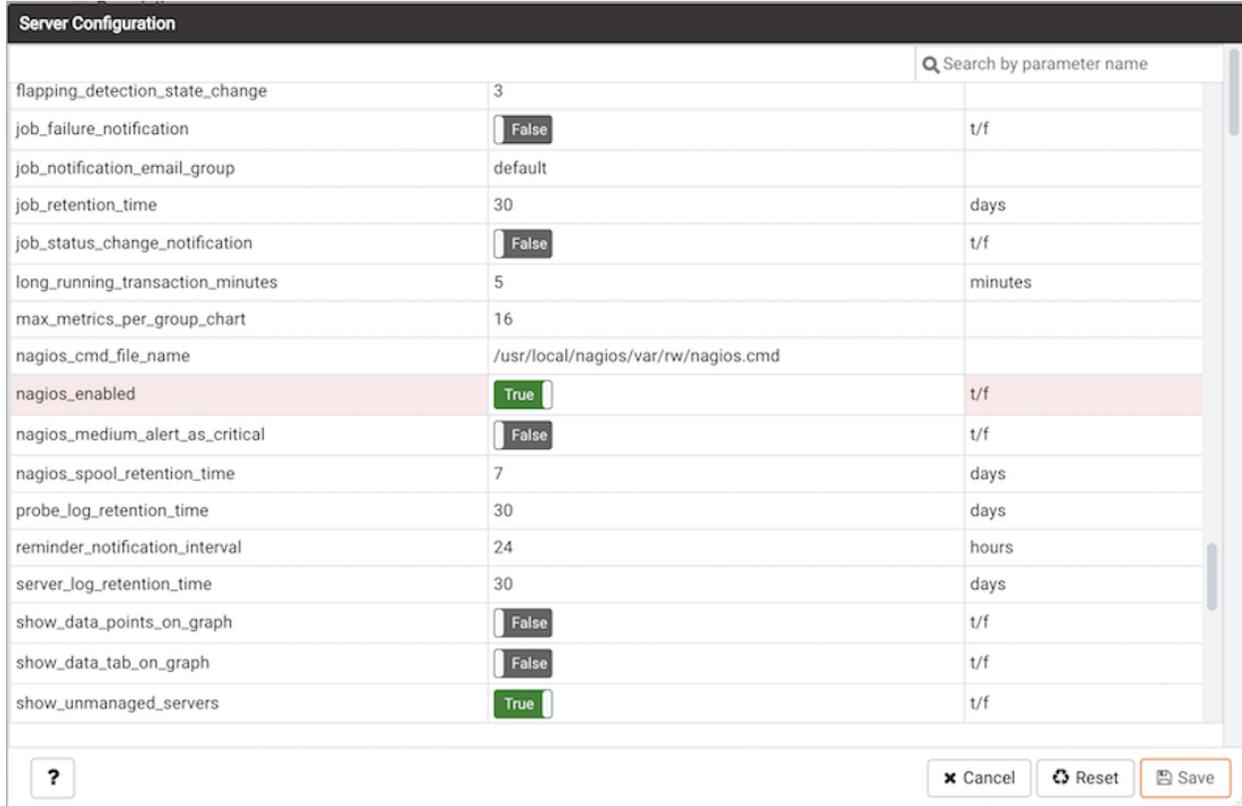
- Set the Execute script slider to Yes to instruct PEM to execute the provided script if an alert is triggered.
- Set the Execute on alert cleared slider to Yes to instruct PEM to execute the provided script when the situation that triggered the the alert has been resolved.
- Use the selector to indicate if the script should execute on the PEM Server or the Monitored Server.
- Provide the script that PEM should execute in the Code field. You can provide a batch/shell script, or SQL code. Within the script you can use the placeholders to replace the following:
 - %AlertName% - the name of the triggered alert.
 - %ObjectName% - the name of the server or agent on which the alert was triggered.
 - %ThresholdValue% - the threshold value reached by the metric when the alert triggered.
 - %CurrentValue% - the current value of the metric that triggered the alert.
 - %CurrentState% - the current state of the alert.
 - %OldState% - the previous state of the alert.
 - %AlertRaisedTime% - the time that the alert was raised, or the most recent time that the alert state was changed.

Fig. 48: The Notification tab

To enable Nagios notification, move the slider next to Submit passive service check result to Nagios to Yes; before exiting the Manage Alerts tab, click the save icon to preserve your changes.

Configuring Nagios-related behavior of the PEM Server

You can use the `Server Configuration` dialog to provide information about your Nagios configuration to the PEM server. To open `Server Configuration` dialog, select `Server Configuration...` from the PEM client's `Management` menu.



The screenshot shows the `Server Configuration` dialog with a search bar and a list of parameters. The `nagios_enabled` parameter is highlighted in red.

| Parameter Name | Value | Unit/Type |
|----------------------------------|--|-----------|
| flapping_detection_state_change | 3 | |
| job_failure_notification | <input type="checkbox"/> False | t/f |
| job_notification_email_group | default | |
| job_retention_time | 30 | days |
| job_status_change_notification | <input type="checkbox"/> False | t/f |
| long_running_transaction_minutes | 5 | minutes |
| max_metrics_per_group_chart | 16 | |
| nagios_cmd_file_name | /usr/local/nagios/var/rw/nagios.cmd | |
| nagios_enabled | <input checked="" type="checkbox"/> True | t/f |
| nagios_medium_alert_as_critical | <input type="checkbox"/> False | t/f |
| nagios_spool_retention_time | 7 | days |
| probe_log_retention_time | 30 | days |
| reminder_notification_interval | 24 | hours |
| server_log_retention_time | 30 | days |
| show_data_points_on_graph | <input type="checkbox"/> False | t/f |
| show_data_tab_on_graph | <input type="checkbox"/> False | t/f |
| show_unmanaged_servers | <input checked="" type="checkbox"/> True | t/f |

Buttons at the bottom: ? (help), Cancel, Reset, Save.

Fig. 49: Specify Nagios properties in the `Server Configuration` dialog

Four server configuration parameters specify information about your Nagios installation and PEM server behavior related to Nagios:

- Use the `nagios_cmd_file_name` parameter to specify the location of the Nagios pipeline file that will receive passive check alerts from PEM. The default value of this parameter is `/usr/local/nagios/var/rw/nagios.cmd`. If your `nagios.cmd` file resides in an alternate location, specify the file location in the `Value` field.
- Move the slider in the `nagios_enabled` parameter to `Yes` to instruct the PEM server to send passive check alerts to Nagios.
- Use the `nagios_medium_alert_as_critical` slider to specify the warning severity that the PEM server will pass to Nagios if a medium alert is triggered:

If the `is_nagios_medium_alert_as_critical` flag is set to `FALSE` and the alert level is `MEDIUM`, the warning message will read `WARNING`.

If the `is_nagios_medium_alert_as_critical` flag is set to `TRUE` and the alert level is `MEDIUM`, the warning message will read `CRITICAL`.

- Use the `nagios_spool_retention_time` parameter to specify the number of days of notification history that will be stored on the PEM server. The default value is 7 days.

After modifying parameter values, click the save icon (in the upper-right corner of the Server Configuration dialog) to preserve your changes.

Creating the `hosts.cfg` and `services.cfg` File

The `templates.cfg` file (by default, located in `/usr/local/nagios/etc/objects`) specifies the properties of a generic-host and generic-service. The properties specify the parameters used in the `hosts.cfg` and `services.cfg` files.

In most cases (when PEM is installed in a default configuration), you will not be required to modify the `templates.cfg` file before creating the `hosts.cfg` and `services.cfg` files. If necessary, you can modify the `templates.cfg` file to specify alternate values for parameters or to create new templates.

Before modifying the Nagios configuration file, use the following command to create a `hosts.cfg` file that contains information about the PEM hosts that reside on the local system:

```
psql -U postgres -p 5433 -d pem -A -t -c "select pem.  
create_nagios_host_config('generic-host') " > /usr/local/nagios/etc/  
objects/hosts.cfg
```

Then, use the following command to create a `services.cfg` file that contains information about the PEM services that reside on the local system:

```
psql -U postgres -p 5433 -d pem -A -t -c "select pem.  
create_nagios_service_config('generic-service') " > /usr/local/nagios/  
etc/objects/services.cfg
```

If you wish to use a custom `template.cfg` file entry, specify the entry name in place of `generic-host` or `generic-service` in the above commands.

Modifying the Nagios Configuration File

After creating the `host.cfg` and `services.cfg` files, you must specify their location in the Nagios configuration file (by default, `/usr/local/nagios/etc/nagios.cfg`). Modify the configuration file, adding entries that specify the location of the files:

```
cfg_file=/usr/local/etc/objects/hosts.cfg
```

```
cfg_file=/usr/local/etc/objects/services.cfg
```

You can use the following command to confirm that Nagios is properly configured:

```
/usr/local/nagios/bin/nagios -v /usr/local/nagios/etc/nagios.cfg
```

After confirming that Nagios is configured correctly, restart the Nagios service:

```
/usr/local/nagios/bin/nagios -d /usr/local/nagios/etc/nagios.cfg
```

Capacity Manager

PEM's Capacity Manager analyzes collected statistics (metrics) to generate a graph or table that displays the historical usage statistics of an object, and can project the anticipated usage statistics for an object. You can configure Capacity Manager to collect and analyze metrics for a specific host, server, database, or database object.

You can tailor the content of the Capacity Manager report by choosing a specific metric (or metrics) to include in the report, the time range over which the metrics were gathered, and a high or low threshold for the metrics analyzed. You can also specify a start and end date for the Capacity Manager report. If the end date of the report specifies a time in the future, Capacity Manager will analyze the historical usage of the selected object to extrapolate the projected object usage in the future.

To open Capacity Manager, select the `Capacity Manager . . .` option from the PEM client Management menu; the Capacity Manager wizard opens, displaying a tree control on the `Metrics` tab.

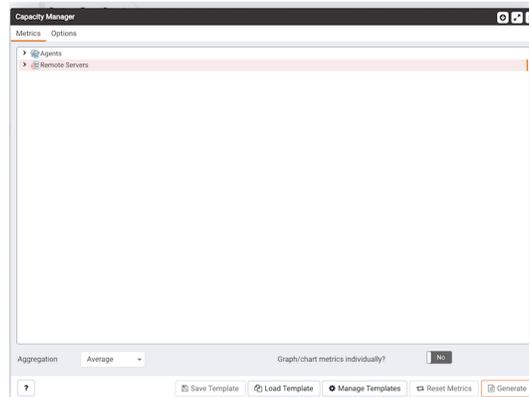


Fig. 1: *Capacity Manager dialog*

Expand the tree control on the `Metrics` tab to review the metrics for the node that you wish to analyze. Check the box to the left of the name of the metric to include the metric in your report.

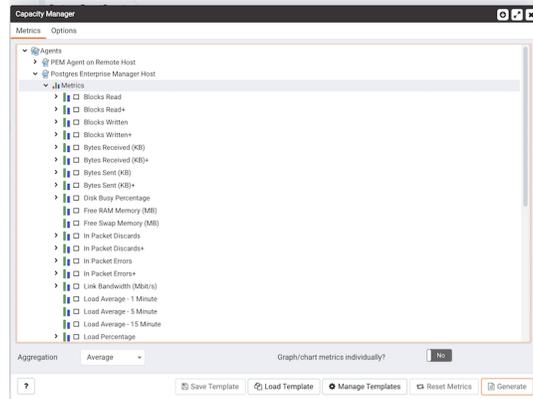


Fig. 2: Capacity Manager dialog - Metrics selection list

Capacity Manager will use the aggregation method specified with the Aggregation drop-down listbox (located at the bottom of the Metrics tab). The aggregation method instructs Capacity Manager how to evaluate and plot the metric values. Select from:

- **Average:** Use the average of the values recorded during the time period.
- **Maximum:** Use the maximum value recorded during the time period.
- **Minimum:** Use the minimum value recorded during the time period.
- **First:** Use the first value recorded during the time period.

To remove a metric from the Capacity Manager report, uncheck the box to the left of the name of a metric.

Move the slider next to *Graph/chart metrics individually?* to *Yes* to instruct Capacity Manager to produce a separate report for each metric selected on the Metrics tab. If the option is set to *No*, all selected metrics will be merged into a single graph or table.

Click the *Generate* button to display the report onscreen (accepting the default configuration options), or use the *Options* tab to customize sampling boundaries, report type and report destination. Please note that the times displayed on the *Options* tab are the time zone in which the PEM client resides.

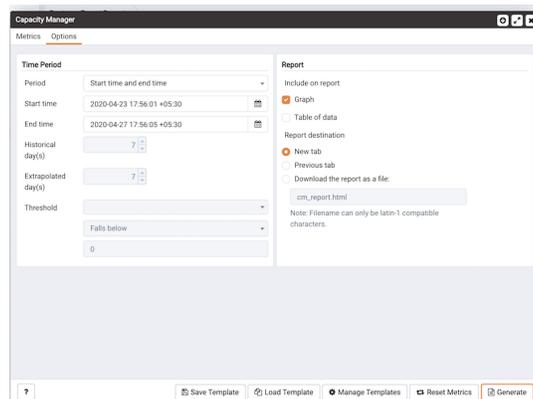


Fig. 3: Specify the time period, type, and destination of the report

Use the fields within the *Time Period* box to define the boundaries of the Capacity Manager report:

- Use the *Period* drop-down listbox to select the type of time period you wish to use for the report. You can select:

| | |
|---------------------------------------|---|
| Start time and end time | Specify a start date and an end date/time for the report. |
| Start time and threshold | Specify a start date and time, and a threshold to determine the end time and date for the report. |
| Historical days and extrapolated days | Specify a start date for the report that is a number of days in the past, and an end date that is a number of days in the future. This option is useful for report templates that do not specify fixed dates. |
| Historical days and threshold | Specify a start date that is a number of days in the past, and end it when a threshold value is reached. |

After specifying the type of time period for the report, select from other options in the Time Period box to define the time period for the report:

- Use the date and time selectors next to the `Start time` field to specify the starting date and time of the sampling period, or select the number of Historical day(s) of data to include in the report. The date and time specified in the `Start time` field must not be later than the current date/time.

By default, Capacity Manager will select a start time that is one week prior to the current date and time.

- The end boundary for the report can be a time, a number of days in the future, or the point at which a selected metric reaches a user-specified threshold value. Use the date and time selectors next to the `End time` field to specify an end boundary for the report, or select the number of Extrapolated day(s) of data to include in the report. The time specified in the `End time` field must be later than the time specified in the `Start time` field.

Note that if you select an end date and time in the future, Capacity Manager will use historical usage information to extrapolate anticipated future usage. Since the projected usage is based on the sampling of historical data, the accuracy of the future usage trend will improve with a longer sampling period.

To specify a threshold value, use the drop-down listbox in the `Threshold` field to select a metric, an operator (Exceeds or Falls below), and enter a target value for the metric. If you choose to define the end of the report using a threshold, the Capacity Manager report will terminate when the value for the selected metric exceeds or falls below the specified value.

The `cm_max_end_date_in_years` configuration parameter defines a default time value for the end boundary of a Capacity Manager report. If you specify a threshold value as the end boundary of a report, and the anticipated usage of the boundary is not met before the maximum time has passed, the report will terminate at the time specified by the `cm_max_date_in_years` parameter. By default, `cm_max_end_date_in_years` is 5; you can use the Server Configuration dialog to modify the value of `cm_max_end_date_in_years`.

The fields in the `Report` box specify the report type and destination. Use the `Include on report` radio buttons to specify the type of report produced by Capacity Manager:

- Select `Graph` to instruct Capacity Manager to display the report in the form of a line graph in the PEM client window.
- Select `Table of data` to instruct Capacity Manager to display a table containing the report data in the PEM client window.
- Select `Graph and table of data` to instruct Capacity Manager to display both a line graph and a data table in the PEM client window.

Use the `Report destination` radio buttons to instruct Capacity Manager where to display or save the report:

- Select `New tab` to instruct Capacity Manager to display the report on a new tab in the PEM client. You must select `New tab` to display the first generation of a Capacity Manager report; for subsequent reports, you may select `Previous tab`.
- Select `Previous tab` to instruct Capacity Manager to re-use a previously opened tab when displaying the report.

- Select `Download` the report as a file and specify a file name to instruct Capacity Manager to write the report to the specified file.

When you have specified the report boundaries and selected the type and destination of the Capacity Manager report, click the `Generate` button to create the report.

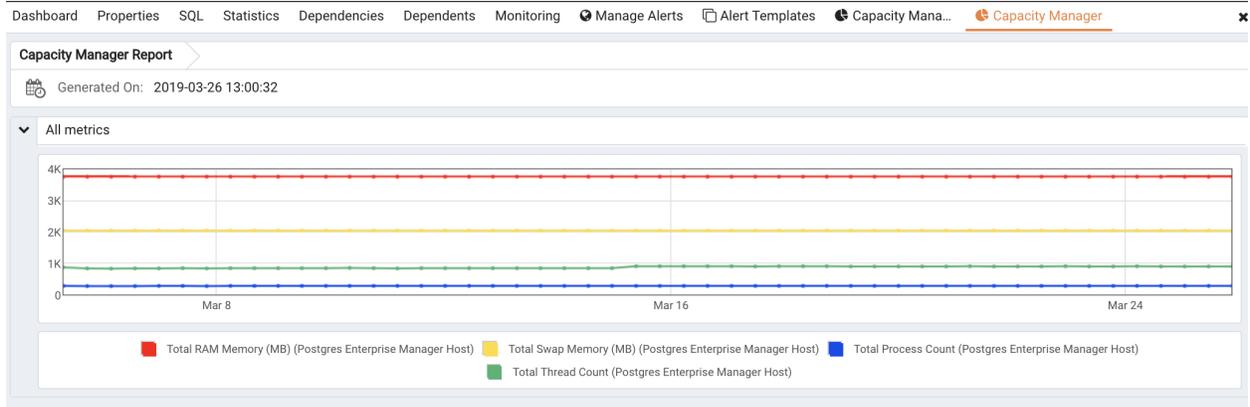


Fig. 4: *The Capacity Manager report*

Reports saved to file are stored in HTML format. You can review a Capacity Manager report with any web browser that supports Scalable Vector Graphics (SVG). Browsers that do not support SVG will be unable to display a Capacity Manager graph and may include unwanted characters.

5.1 Capacity Manager Templates

After defining a report, you can save the definition as a template for future reports. Capacity Manager report templates may be accessed by all PEM users. To save a report definition as a template:

1. Use the `Metrics` and `Options` tabs to define your report.
2. Click the `Save` button to open the `Save Template` dialog.

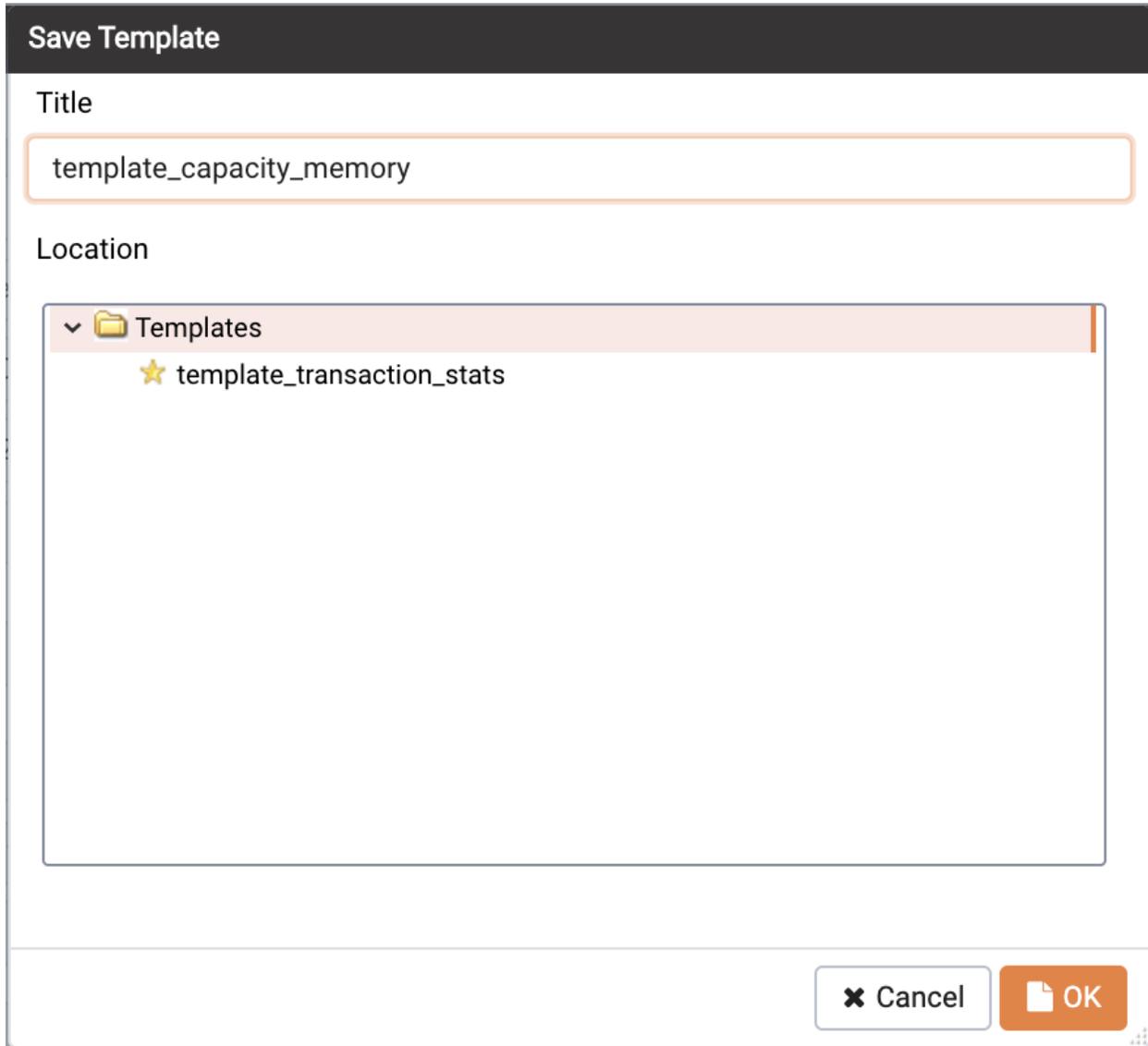


Fig. 5: Saving a Capacity Manager Template

3. Provide a report name in the `Title` field, select a location to store the template in the tree control.
4. Click `OK`.

When creating a report, you can use the `Load Template` button to browse and open an existing template. Once opened, the report definition may be modified if required, and optionally saved again, either as a new template, or overwriting the original template.

Use the `Manage Templates` button open a dialog that allows you to rename or remove unwanted templates.

You can use the PEM Audit Manager to simplify audit log configuration for Advanced Server instances. With the Audit Manager, you can configure logging attributes such as:

- How often log files are to be collected by PEM
- The type of database activities that are included in the log files
- How often (and when) log files are to be rotated

Audit logs may include the following activities:

- All connections made to the database instance
- Failed connection attempts
- Disconnections from the database instance
- All queries (SELECT statements)
- All DML statements (INSERT, UPDATE, DELETE)
- All DDL statements (e.g., CREATE, DROP, ALTER)

Once the audit logs are stored on the PEM server, you can use the Audit Log dashboard to review the information in an easy-to-read form. The Audit Log dashboard allows you to filter the log file by timestamp range (when an activity occurred), the database on which the activity occurred, the user performing the activity, or the type of command being invoked.

6.1 Setting the Advanced Server Instance Service ID

To configure logging for an Advanced Server instance, the server must be a PEM-managed server with a bound agent, and the server registration must include the name of a service script. When registering a new server, include the service name in the Service ID field on the Advanced tab of the New Server dialog.

Before adding a service name to an existing (registered and connected) server, you must disconnect the server. Right click on the server name, and select `Disconnect server` from the context menu. Then, right click on the server name and select `Properties` from the context menu. Select the Advanced tab, and add a service name to the Service ID field.

The screenshot shows the EPAS configuration dialog with the 'Advanced' tab selected. The 'Service ID' field contains the text 'edb-as-11'. Other fields include 'Host address', 'DB restriction', 'Password file', 'EFM cluster name', 'EFM installation path', and 'Connection timeout (seconds)' set to 0. At the bottom, there are buttons for 'Cancel', 'Reset', and 'Save', along with information and help icons.

Fig. 1: *The Service ID of the Advanced Server instance*

The Service ID field allows the PEM server to stop and start the service.

- The name of the Advanced Server 11 service script is `edb-as-11`.
- The name of the Advanced Server 10 service script is `edb-as-10`.
- The name of the Advanced Server 9.6 service script is `edb-as-9.6`.
- The name of the PostgreSQL 9.6 service script is `postgresql-11`.
- The name of the PostgreSQL 9.6 service script is `postgresql-10`.
- The name of the PostgreSQL 9.6 service script is `postgresql-9.6`.

6.2 Setting the EDB Audit Configuration Probe

Before configuring audit logging of Advanced Server servers, you must ensure that the EDB Audit Configuration probe is enabled. To open the `Manage Probes` tab and check the status of the probe, right click on the name of a registered Advanced Server server in the tree control, and select `Manage Probes...` from the Management menu.

Ensure that the `Enabled` column in the `Probe Configuration` dialog is set to `Yes` for the EDB Audit Configuration probe.

| Quick Links | | | | | | | |
|---|---|--|---------|---|---|---|------|
|  Manage Custom Probes | |  Copy Probes | | |  Help | | |
| Probes | | | | | | | |
| Probe name | Execution Frequency | | | Enabled? | | Data Retention | |
| | Default? | Minutes | Seconds | Default? | Probe Enable? | Default? | Days |
| Background Writer Statistics | <input type="checkbox"/> No | 1 | 0 | <input type="checkbox"/> No | <input type="checkbox"/> No | <input type="checkbox"/> No | 183 |
| Blocked Session Information | <input type="checkbox"/> No | 1 | 0 | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 180 |
| Data and Log File Analysis | <input checked="" type="checkbox"/> Yes | 30 | 0 | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 180 |
| Database Frozen XID | <input type="checkbox"/> No | 0 | 10 | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 180 |
| Database Size | <input checked="" type="checkbox"/> Yes | 30 | 0 | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 180 |
| Database Statistics | <input checked="" type="checkbox"/> Yes | 30 | 0 | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 90 |
| EDB Audit Configuration | <input checked="" type="checkbox"/> Yes | 30 | 0 | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | <input checked="" type="checkbox"/> Yes | 180 |
| Failover Manager Cluster Info | <input checked="" type="checkbox"/> Yes | 5 | 0 | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> Yes | 7 |

Fig. 2: The EDB Audit Configuration probe

If EDB Audit Configuration is not enabled, use the `Enabled?` switch on the `Manage Probes` tab to enable it.

6.3 Configuring Audit Logging with the Audit Manager

To open the Audit manager wizard, select `Audit Manager...` from the Management menu. The Audit manager - Welcome dialog opens.

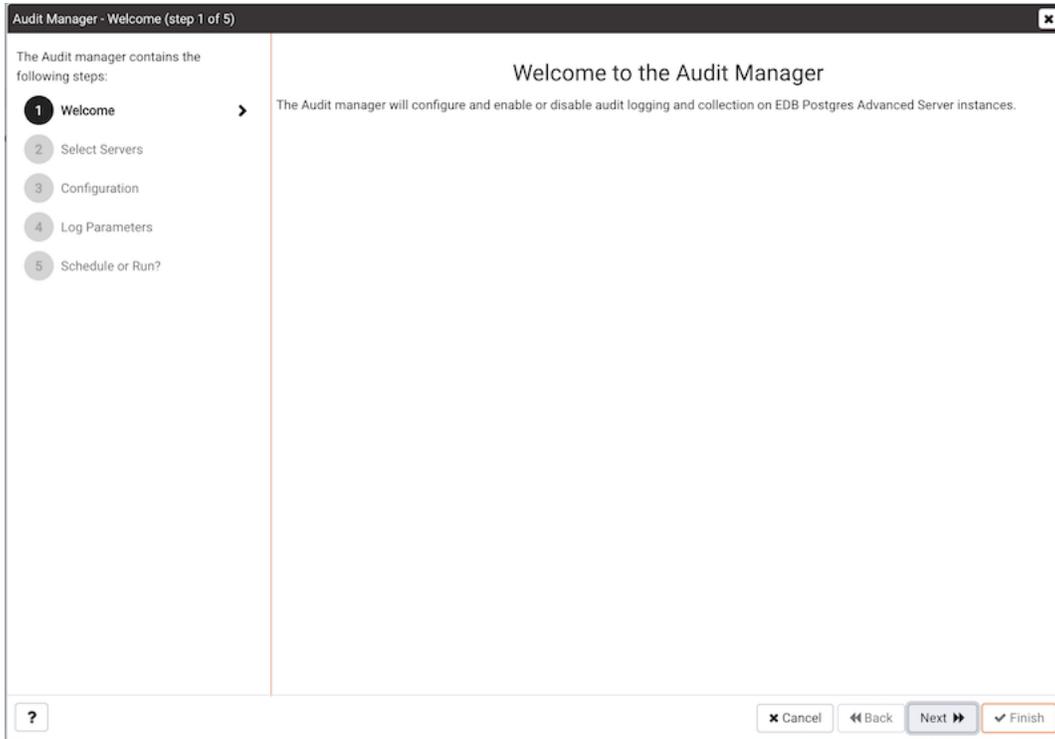


Fig. 3: *The Audit Manager Welcome dialog*

Click `Next` to continue.

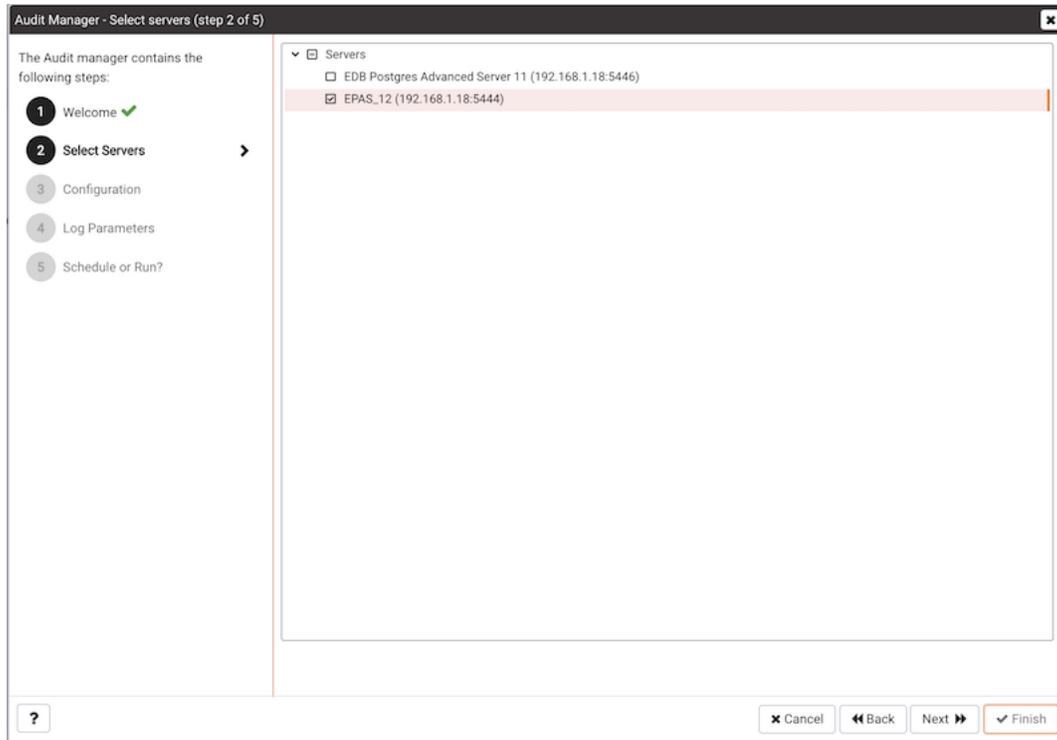


Fig. 4: *Select the servers you wish to configure for auditing*

Use the Select servers tree control to specify the servers to which the auditing configuration will be applied. To make a server available in the tree control, you must provide the `Service ID` on the `Advanced` tab of the `Create - Server` dialog when registering a server for monitoring by PEM. Note that only EDB Postgres Advanced Server supports auditing; PostgreSQL servers will not be included in the tree control.

Click `Next` to continue.

The `Auditing Parameters Configuration` dialog lets you enable or disable auditing and choose how often log records are collected into PEM.

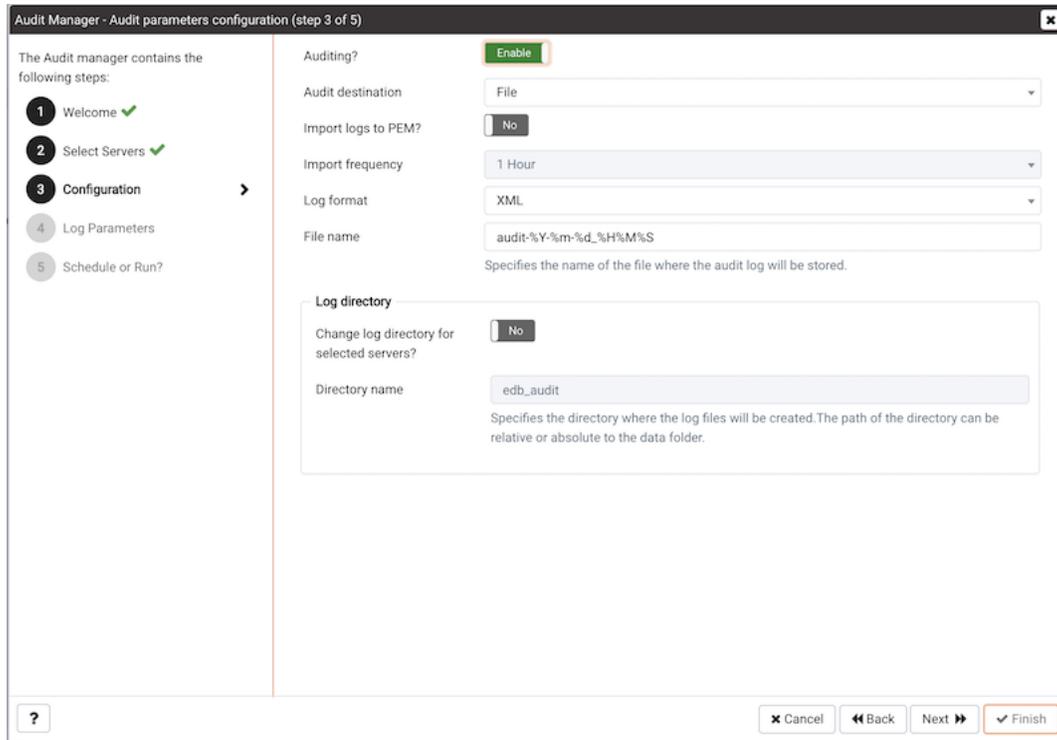


Fig. 5: The Auditing Parameters Configuration dialog

Use the fields on the `Auditing parameters configuration` dialog to specify auditing preferences:

- Use the `Auditing` switch to `Enable` or `Disable` auditing on the specified servers.
- Use the `Audit destination` drop-down to select a destination for the audit logs; select `File` or `Syslog`. Please note this feature is supported on Advanced Server 10 and newer releases only.
- Use the `Import logs to PEM` switch to instruct PEM to periodically import log records from each server to the PEM Server. Set the switch to `Yes` to import log files; the default is `No`.
- Use the `Collection frequency` drop-down listbox to specify how often PEM will collect log records from monitored servers when log collection is enabled.
- Use the `Log format` drop-down listbox to select the raw log format that will be written on each server. If log collection is enabled, the PEM server will use `CSV` format.
- Use the `File name` field to specify the format used when generating log file names. By default, the format is set to `audit-%Y-%m-%d_%H%M%S` where:

`audit` is the file name specified in the `Audit Directory Name` field

`Y` is the year that the log was stored

`m` is the month that the log was stored

`d` is the day that the log was stored

`H` is the hour that the log was stored

`M` is the minute that the log was stored

`S` is the second that the log was stored

- Check the box next to `Change Log Directory for selected servers?` and use the `Audit Directory Name` field to specify a directory name to which the audit logs will be written. The directory will reside beneath the data directory on the PEM server.

Use fields in the `Log directory` box to specify information about the directory in which the log files will be saved:

- Move the `Change log directory for selected servers?` switch to `Yes` to enable the `Directory name` field.
- Use the `Directory name` field to specify the name of the directory on each server into which audit logs will be written. The directory specified will be created as a sub-directory of the data directory on the server.

Click `Next` to continue.

The `Audit log configuration` dialog is only available if you have enabled auditing on the `Auditing parameters configuration` dialog.

The screenshot shows the 'Audit Manager - Audit log configuration (step 4 of 5)' dialog. On the left, a progress indicator shows five steps: 1. Welcome (checked), 2. Select Servers (checked), 3. Configuration (checked), 4. Log Parameters (active), and 5. Schedule or Run?. The main area contains several configuration sections:

- Connection attempts:** A radio button group with 'None' selected, 'All', and 'Failed' options. A description below explains that 'None' disables auditing, 'All' audits all attempts, and 'Failed' audits only failed attempts.
- Disconnection attempts:** A radio button group with 'None' selected and 'All' option. A description explains that 'All' enables auditing of disconnections, while 'None' disables it.
- Log statements:** A text input field containing 'Select', 'Error', 'DML', and 'DDL' with 'x' icons for removal. A description states it is used to specify auditing categories of SQL statements.
- Audit tag:** An empty text input field. A description explains it is used to specify a string value included in audit logs when the `edb_audit` parameter is set to CSV or XML.
- Log rotation:** A section with an 'Enable?' checkbox (set to 'No'), a 'Day' dropdown menu (set to 'None'), and 'Size(MB)' and 'Time(seconds)' input fields (both set to '0').

At the bottom right, there are buttons for 'Cancel', 'Back', 'Next', and 'Finish'.

Fig. 6: *The Audit Log Configuration dialog*

Use the controls on the `Audit log configuration` dialog to specify log configuration details that will be applied to each server:

- Use the `Connection attempts` switch to specify if connection attempts should be logged:
 - `None` to disable connection logging.
 - `All` to indicate that all connection attempts will be logged.
 - `Failed` to log any connection attempts that fail.
- Use the `Disconnection attempts` switch to specify if disconnections should be logged. Specify:
 - `None` to specify that disconnections should not be logged.
 - `All` to enable disconnection logging.

- Use the `Log statements` field to specify the statement types that will be logged. Click within the field, and select from:

`Select` - All statements that include the `SELECT` keyword will be logged.

`Error` - All statements that result in an error will be logged.

`DML` - All DML (Data Modification Language) statements will be logged.

`DDL` - All DDL (Data Definition Language) statements (those that add, delete or alter data) will be logged.

Check the box next to `Select All` to select all statement types.

Check the box next to `Unselect All` to deselect all statement types.

- Use the `Audit tag` field to specify a tracking tag for the collected logs. Please note that audit tagging functionality is available only for [supported versions](#) of Advanced Server.

Use the fields in the `Log rotation` box to specify how the log files are managed on each server:

- Use the `Enable?` switch to specify that logfiles should be rotated. Please note that a new log file should be used periodically to prevent a single file becoming unmanageably large.
- Use the `Day` drop-down listbox to select a day or days on which the log file will be rotated.
- Use the `Size (MB)` field to specify a size in megabytes at which the log file will be rotated.
- Use the `Time (seconds)` field to specify the number of seconds between log file rotations.

Click `Next` to continue:

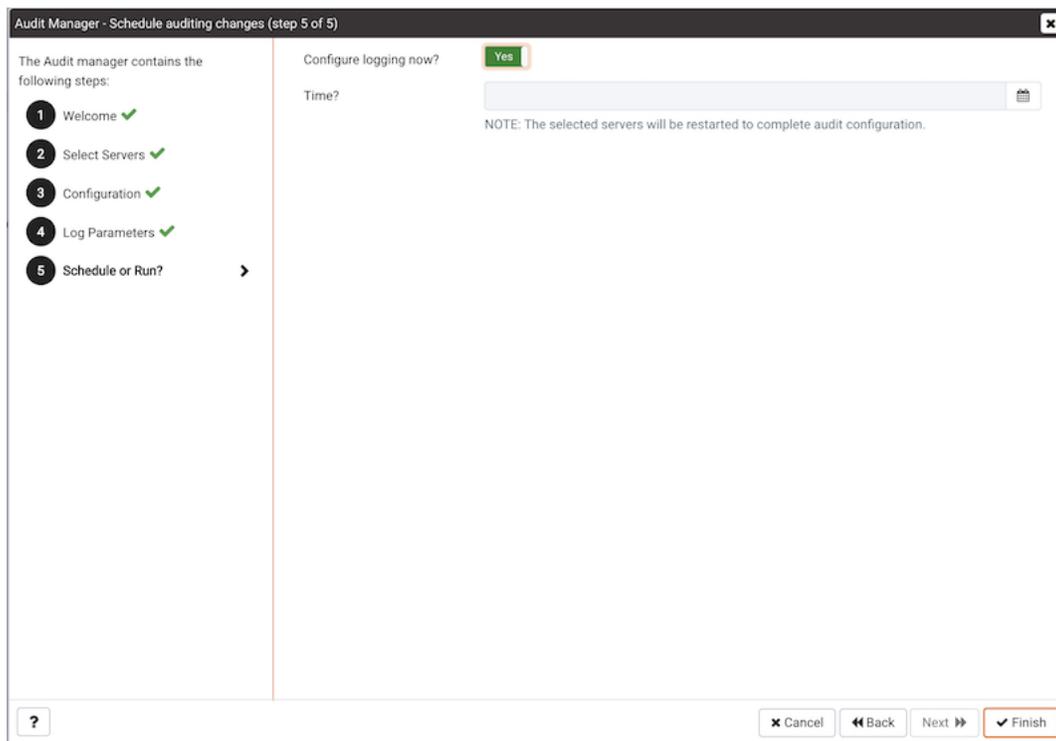


Fig. 7: *The Schedule Auditing Changes dialog*

Use the `Schedule Auditing Changes` dialog to determine when auditing configuration changes are to take effect.

- Select `Configure logging now?` if you want the auditing configuration changes to take place immediately. The affected database servers will be restarted so the auditing changes can take effect.
- Use the `Time?` selector to schedule the auditing configuration changes to take place at some point in the future. Select the desired date and time from the drop-down lists. The affected database servers will be restarted at the specified date/time to put the auditing changes into effect.

Click `Finish` to complete the auditing configuration process.

The Audit Manager will schedule a job to apply the configuration to each server. The job will consist of two tasks: one to update the audit logging configuration on the server, and one to restart the server with the new configuration.

You can use the `Scheduled Tasks` tab to review a list of Scheduled jobs. To open the `Scheduled Tasks` tab, highlight the name of a server or agent and select `Scheduled Tasks . . .` from the `Management` menu.

6.4 Viewing the Log with the Audit Log Dashboard

Use the Audit Log dashboard to view the audit log from Advanced Server database instances.

To open the Audit Log dashboard, right click on a server or agent node, and select Audit Log Analysis from the Dashboards menu. You can also open the Audit Log dashboard by navigating through the Dashboards menu (located on the Management menu).

| id | Server | Timestamp | User Name | Database Name | Process ID | Session ID | Transaction ID | Connection From | Command | Message |
|------|---------|----------------------|--------------|---------------|------------|---------------|----------------|-----------------|----------------|--|
| 7879 | EPAS_12 | 29/04/2020, 10:00:07 | enterprisedb | postgres | 26391 | 5ea902cf.6717 | 0 | 127.0.0.1:46780 | idle | disconnection: session time: 0:00:00.014 user=enterprisedb database=postgres host=127.0.0.1 port=46780 |
| 7878 | EPAS_12 | 29/04/2020, 10:00:07 | enterprisedb | postgres | 26391 | 5ea902cf.6717 | 0 | 127.0.0.1:46780 | idle | statement: SELECT setting FROM pg_settings WHERE name = 'edb_audit_rotation_seconds' |
| 7877 | EPAS_12 | 29/04/2020, 10:00:07 | enterprisedb | postgres | 26391 | 5ea902cf.6717 | 0 | 127.0.0.1:46780 | idle | statement: SELECT version(); |
| 7876 | EPAS_12 | 29/04/2020, 10:00:07 | enterprisedb | postgres | 26391 | 5ea902cf.6717 | 0 | 127.0.0.1:46780 | authentication | connection authorized: user=enterprisedb database=postgres |
| 7875 | EPAS_12 | 29/04/2020, 10:00:07 | enterprisedb | postgres | 26388 | 5ea902cf.6714 | 0 | 127.0.0.1:46774 | idle | disconnection: session time: 0:00:00.007 user=enterprisedb database=postgres host=127.0.0.1 port=46774 |
| 7874 | EPAS_12 | 29/04/2020, 10:00:07 | enterprisedb | postgres | 26388 | 5ea902cf.6714 | 0 | 127.0.0.1:46774 | authentication | connection authorized: user=enterprisedb database=postgres |
| 7873 | EPAS_12 | 29/04/2020, 10:00:07 | enterprisedb | postgres | 26384 | 5ea902cf.6710 | 0 | 127.0.0.1:46766 | idle | disconnection: session time: 0:00:00.029 user=enterprisedb database=postgres host=127.0.0.1 port=46766 |
| 7872 | EPAS_12 | 29/04/2020, 10:00:07 | enterprisedb | postgres | 26384 | 5ea902cf.6710 | 0 | 127.0.0.1:46766 | idle | statement: SELECT setting FROM pg_settings WHERE name='log_temp_files' |
| 7871 | EPAS_12 | 29/04/2020, 10:00:07 | enterprisedb | postgres | 26384 | 5ea902cf.6710 | 0 | 127.0.0.1:46766 | idle | statement: SELECT setting FROM pg_settings WHERE name='log_autovacuum_min_duration' |
| 7870 | EPAS_12 | 29/04/2020, 10:00:07 | enterprisedb | postgres | 26384 | 5ea902cf.6710 | 0 | 127.0.0.1:46766 | idle | statement: SELECT setting FROM pg_settings WHERE name='log_min_duration_statement' |
| 7869 | EPAS_12 | 29/04/2020, 10:00:07 | enterprisedb | postgres | 26384 | 5ea902cf.6710 | 0 | 127.0.0.1:46766 | idle | statement: SELECT (setting::int/(24*60))::int FROM pg_settings WHERE name = 'log_rotation_age' |
| 7868 | EPAS_12 | 29/04/2020, 10:00:07 | enterprisedb | postgres | 26384 | 5ea902cf.6710 | 0 | 127.0.0.1:46766 | idle | statement: SELECT (setting::int/1024)::int FROM pg_settings WHERE name = 'log_rotation_size' |
| 7867 | EPAS_12 | 29/04/2020, 10:00:07 | enterprisedb | postgres | 26384 | 5ea902cf.6710 | 0 | 127.0.0.1:46766 | idle | statement: SELECT upper(setting) FROM pg_settings WHERE name='syslog_facility'; |

Fig. 8: The Audit Log dashboard

The Audit Log dashboard displays the audit records in reverse chronological order (newest records at the top, oldest records towards the bottom).

To view older audit records that do not appear in the window, use the vertical scroll bar controlling the list of audit records (the innermost scroll bar of the two located on the right-hand side of the window). As you move the scroll bar towards the bottom of the window, older audit records are continuously loaded and displayed.

You can use filtering to limit the number of audit records that are displayed. Click Show Filters to expose the filters panel.

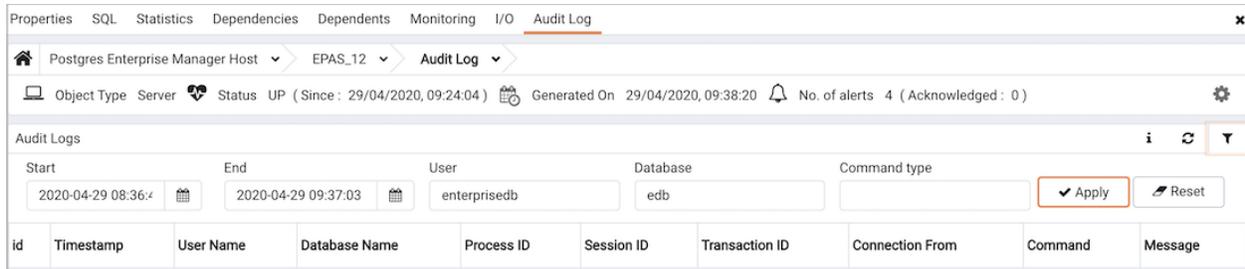


Fig. 9: The Audit Log dashboard filters panel

Use the fields in the `filters` panel to provide certain selection criteria for the audit records you wish to display.

- Use the `Start` field to specify a start date for the report. Click the mouse button in the field to open a calendar and select a start date.
- Use the `End` field to specify an end date for the report. Click the mouse button in the field to open a calendar and select an end date.
- Use the `User` field to display only those entries where the activity was initiated by the given Postgres user.
- Use the `Database` field to display only those entries where the activity was issued on the given database.
- Use the `Command type` field to display only those entries where the activity was of the given type. Command types you can specify are `idle`, `authentication`, and `SELECT`. (For viewing SQL statements from user applications, specify the `idle` command type.)

Click `Filter` to apply the filtering criteria to the log entries.

You can use the PEM Log Manager to simplify server log configuration for Postgres instances. With the Log Manager, you can modify all of your server log parameters with a click:

- Where log files are written
- How often log files are written
- The type of information written to log files
- The format of log file entries
- Log rotation properties

To configure logging for a Postgres instance, the server must be registered as a PEM-managed server, and the registration information must include the name of a service script.

To open the Log Manager, select the `Log Manager . . .` option from the `Management` menu of the PEM client. The wizard opens, welcoming you to the Log Manager.

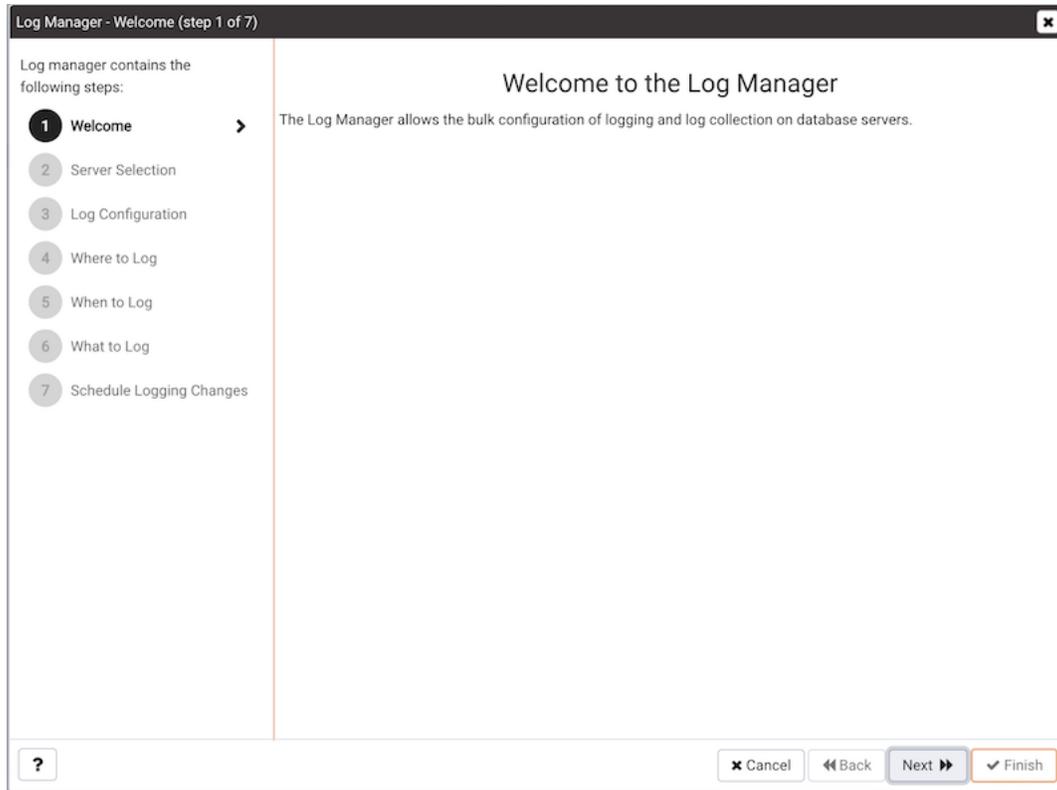


Fig. 1: *The Log Manager welcome dialog*

Click **Next** to continue to the **Server** selection dialog.

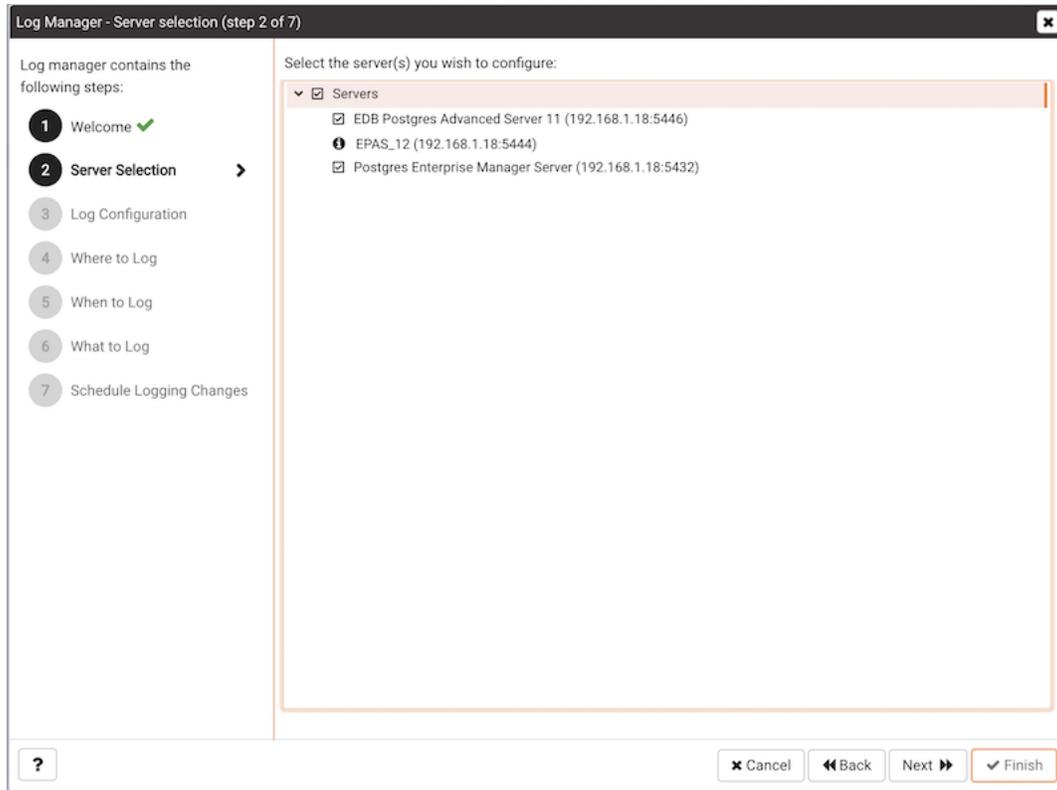


Fig. 2: *The Log Manager Server selection dialog*

The `Server selection` dialog displays a list of the server connections monitored by PEM. Check the box next to the name of a server (or servers) to which the Log Manager wizard will apply the specified configuration. Log Manager is disabled for any server displaying a red exclamation mark to the left of its name in the `Server selection` tree control; there are several reasons that a server may not be enabled:

- Only a server that specifies a `Service ID` on the `Advanced` tab of the `Properties` dialog can be configured by Log Manager.

To provide a service ID, right click on the server name in the tree control, and select `Disconnect Server` from the context menu; if prompted, provide a password. Then, open the context menu for the server, and select `Properties`. Navigate to the `Advanced` tab, and provide the name of the service in the `Service ID` field; click `Save` to save your change and exit the dialog.

- If the PEM agent bound to the server does not have sufficient privileges to restart the server, the server will be disabled.
- If the PEM agent bound to the server is an older version than the associated PEM server, the server will be disabled.

Click `Next` to continue.

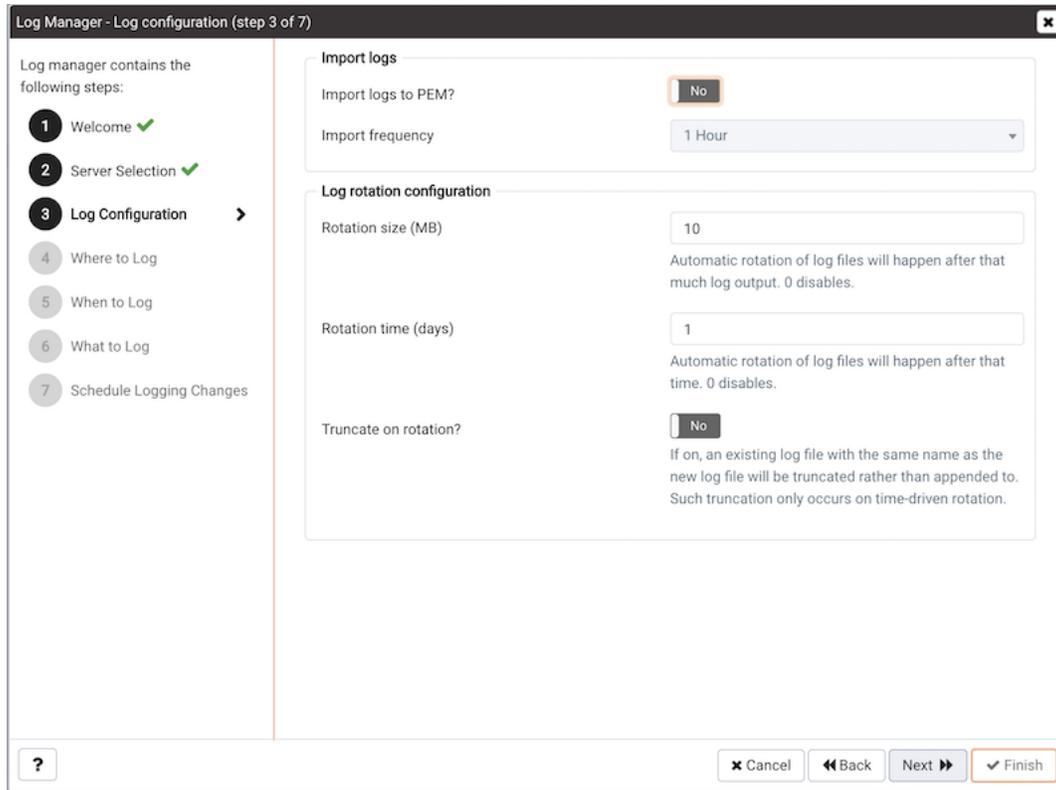


Fig. 3: The Log Manager Log configuration dialog

Use the options on the Log configuration dialog to specify how often log files will be imported to PEM and to specify log rotation details:

Options within the Import Logs box specify how often log files will be imported to PEM:

- Use the switch next to the Import logs to PEM label to specify if log files will be imported to PEM and displayed on the Server Log Analysis dashboard.
- Use the Import Frequency drop-down list box to specify how often log files are imported to PEM.

Use the fields in the Log rotation configuration box to specify the maximum length (lifespan or size) of a log file:

- Use the Rotation Size field to specify the maximum size in megabytes of an individual log file. The default value is 10 MB; when set to 0, no limit is placed on the maximum size of a log file.
- Use the Rotation Time field to specify the number of whole days that should be stored in each log file. The default value is 1 day.

Use the Truncation on Rotation switch to specify server behavior for time-based log file rotation:

- Select ON to specify that the server should overwrite any existing log file that has the same name that a new file would take.
- Select OFF to specify that the server should append any new log file entries to an existing log file with the same name that a new log file would take. This is the default behavior.

Click Next to continue.

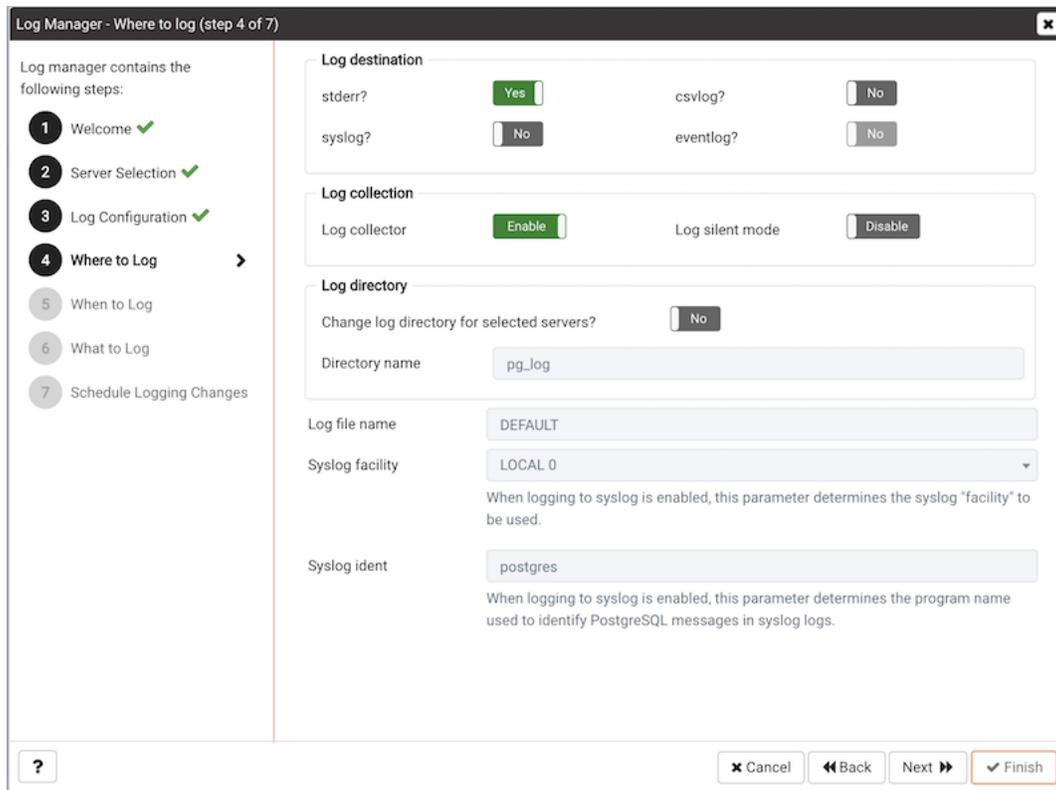


Fig. 4: *The Where to Log dialog*

Use the fields on the `Where to log` dialog to specify where log files should be written.

- Select an option from the `Log Destination` box to specify a destination for the server log output:
 - Set the `stderr` switch to `Yes` to specify that log files should be written to `stderr`.
 - Set the `csvlog` switch to `Yes` to specify that log files should be written to file in a comma-separated value format. This option is automatically enabled (and no longer editable) if you have selected `Import logs to PEM` on the `Schedule` dialog; if you are not importing server log files to PEM, this option is editable.
 - Set the `syslog` switch to `Yes` to specify that log files should be written to the system log files.
 - On Windows, set the `eventlog` switch to `Yes` to specify that log files should be written to the event log.
- Use the options within the `Log collection` box to specify your collection preferences:
 - Set the `Log Collector` switch to `Enable` to instruct the server to re-direct captured log messages (directed to `STDERR`) into log files.
 - Set the `Log Silent Mode` switch to `Enable` to instruct the server to run silently in the background, disassociated from the controlling terminal.
- Use options in the `Log Directory` box to specify log file location preferences:
 - Set the `Change log directory for selected servers?` switch to `Yes` to specify that each set of log files should be maintained in a separate directory.
 - Use the `Directory name` field to specify the directory to which log files will be written. The directory will reside beneath the `pg_log` directory under the installation directory of the monitored server.

- Use the `Log File Name` field to specify a format for the log file name. If set to `DEFAULT`, the format is `enterprisedb-%Y-%m-%d_%H%M%S`, where:
 - `enterprisedb` is the file name prefix
 - `Y` is the year that the log was stored
 - `m` is the month that the log was store
 - `d` is the day that the log was stored
 - `H` is the hour that the log was stored
 - `M` is the minute that the log was store
 - `S` is the second that the log was stored

When logging to syslog is enabled:

- Use the `Syslog Facility` drop-down list box to specify which syslog facility should be used.
- Use the `Syslog Ident` field to specify the program name that will identify Advanced Server entries in system logs.

Click `Next` to continue.

Log Manager - When to log (step 5 of 7)

Log manager contains the following steps:

- Welcome ✓
- Server Selection ✓
- Log Configuration ✓
- Where to Log ✓
- When to Log** ▶
- What to Log
- Schedule Logging Changes

| | | |
|----------------------------------|---------|---|
| Client min messages | notice | Message levels sent to the client. |
| Log min messages | warning | Message levels written to the server log. |
| Log min error statement | error | SQL statements that cause an error condition are recorded in the server log. |
| Log min duration statement (ms) | 0 | Logs only statements running at least this number of milliseconds. -1: disabled, 0 logs all with durations. |
| Log temp files (kilobytes) | -1 | Log temporary files equal or larger than the specified size; -1 disables, 0 logs all temp files. |
| Log autoVacuum min duration (ms) | -1 | If auto-vacuuming exceeds the length of time specified, the activity will be logged. The default value is -1. |

Buttons: ? Cancel Back Next Finish

Fig. 5: The Log Manager When to Log dialog

Use the fields on the `When to log` dialog to specify which events will initiate a log file entry. The severity levels (in order of severity, from most severe to least severe) are:

- `panic` - Errors that cause all database sessions to abort.
- `fatal` - Errors that cause a session to abort.

- `log` - Information messages of interest to administrators.
- `error` - Errors that cause a command to abort.
- `warning` - Error conditions in which a command will complete but may not perform as expected.
- `notice` - Items of interest to users. This is the default.
- `info` - Information implicitly requested by the user.
- `debug5` through `debug1` - Detailed debugging information useful to developers.
- Use the `Client min messages` drop-down list box to specify the lowest severity level of message sent to the client application.
- Use the `Log min messages` drop-down list box to specify the lowest severity level that will be written to the server log.
- By default, when an error message is written to the server log, the text of the SQL statement that initiated the log entry is not included. Use the `Log min error statement` drop-down list box to specify a severity level that will trigger SQL statement logging. If a message is of the specified severity or higher, the SQL statement that produced the message will be written to the server log.
- Use the `Log min duration statement` drop-down list box to specify a statement duration (in milliseconds); any statements that exceed the specified number of milliseconds will be written to the server log. A value of -1 disables all duration-based logging; a value of 0 logs all statements and their duration.
- Use the `Log temp files` field to specify a file size in kilobytes; when a temporary file reaches the specified size, it will be logged. A value of -1 (the default) disables this functionality.
- Use the `Log autoVacuum min duration` field to specify a time length in milliseconds; if auto-vacuuming exceeds the length of time specified, the activity will be logged. A value of -1 (the default) disables this functionality.

Click `Next` to continue.

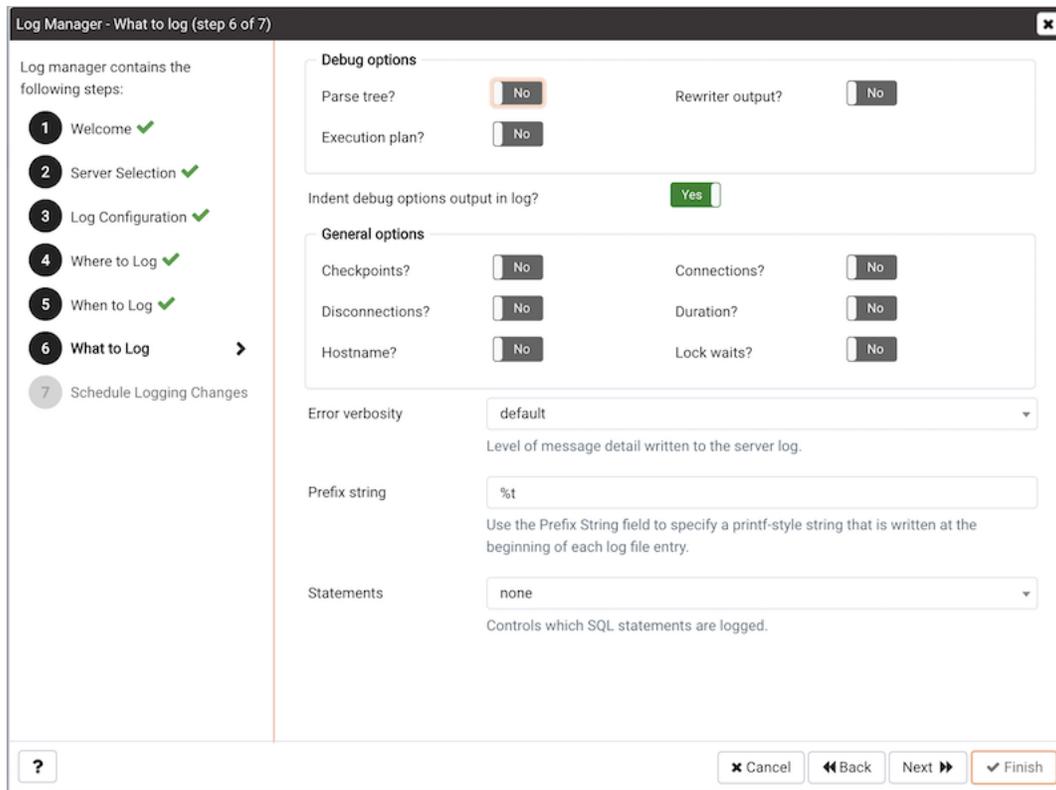


Fig. 6: *The Log Manager What to Log dialog*

Use the fields on the `What to log` dialog to specify log entry options that are useful for debugging and auditing.

The switches in the `Debug options` box instruct the server to include information in the log files related to query execution that may be of interest to a developer:

- Set the `Parse tree` switch to `Yes` to instruct the server to include the parse tree in the log file.
- Set the `Rewriter output` switch to `Yes` to instruct the server to include query rewriter output in the log file.
- Set the `Execution plan` switch to `Yes` to instruct the server to include the execution plan for each executed query in the log file.

When the `Indent Debug Options Output in Log` switch is set to `Yes`, the server indents each line that contains a parse tree entry, a query rewriter entry or query execution plan entry. While indentation makes the resulting log file more readable, it does result in a longer log file.

Use the switches in the `General Options` box to instruct the server to include auditing information in the log file:

- Set the `Checkpoints` switch to `Yes` to include checkpoints and restartpoints in the server log.
- Set the `Connections` switch to `Yes` to include each attempted connection to the server (as well as successfully authenticated connections) in the server log.
- Set the `Disconnections` switch to `Yes` to include a server log entry for each terminated session that provides the session information and session duration.
- Set the `Duration` switch to `Yes` to include the amount of time required to execute each logged statement in the server log.
- Set the `Hostname` switch to `Yes` to include both the IP address and host name in each server log entry (by default, only the IP address is logged). Please note that this may cause a performance penalty.

- Set the `Lock Waits` switch to `Yes` to instruct the server to write a log entry for any session that waits longer than the time specified in the `deadlock_timeout` parameter to acquire a lock. This is useful when trying to determine if lock waits are the cause of poor performance.

Use the `Error verbosity` drop-down list box to specify the detail written to each entry in the server log:

- Select `default` to include the error message, `DETAIL`, `HINT`, `QUERY` and `CONTEXT` in each server log entry.
- Select `terse` to log only the error message.
- Select `verbose` to include the error message, the `DETAIL`, `HINT`, `QUERY` and `CONTEXT` error information, `SQLSTATE` error code and source code file name, the function name, and the line number that generated the error.

Use the `Prefix string` field to specify a `printf`-style string that is written at the beginning of each log file entry. For information about the options supported, please see the `log_line_prefix` documentation (in the Postgres core documentation), available at:

<http://www.postgresql.org/docs/current/static/runtime-config-logging.html>

Use the `Statements` drop-down list box to specify which SQL statements will be included in the server log. The default is `none`; valid options are:

- Specify `none` to disable logging of SQL statements.
- Specify `ddl` to instruct the server to log `ddl` (data definition language) statements, such as `CREATE`, `ALTER`, and `DROP`.
- Specify `mod` to instruct the server to log all `ddl` statements, as well as all `dml` (data modification language) statements, such as `INSERT`, `UPDATE`, `DELETE`, `TRUNCATE` and `COPY FROM`.
- Specify `all` to instruct the server to log all SQL statements.

Click `Next` to continue.

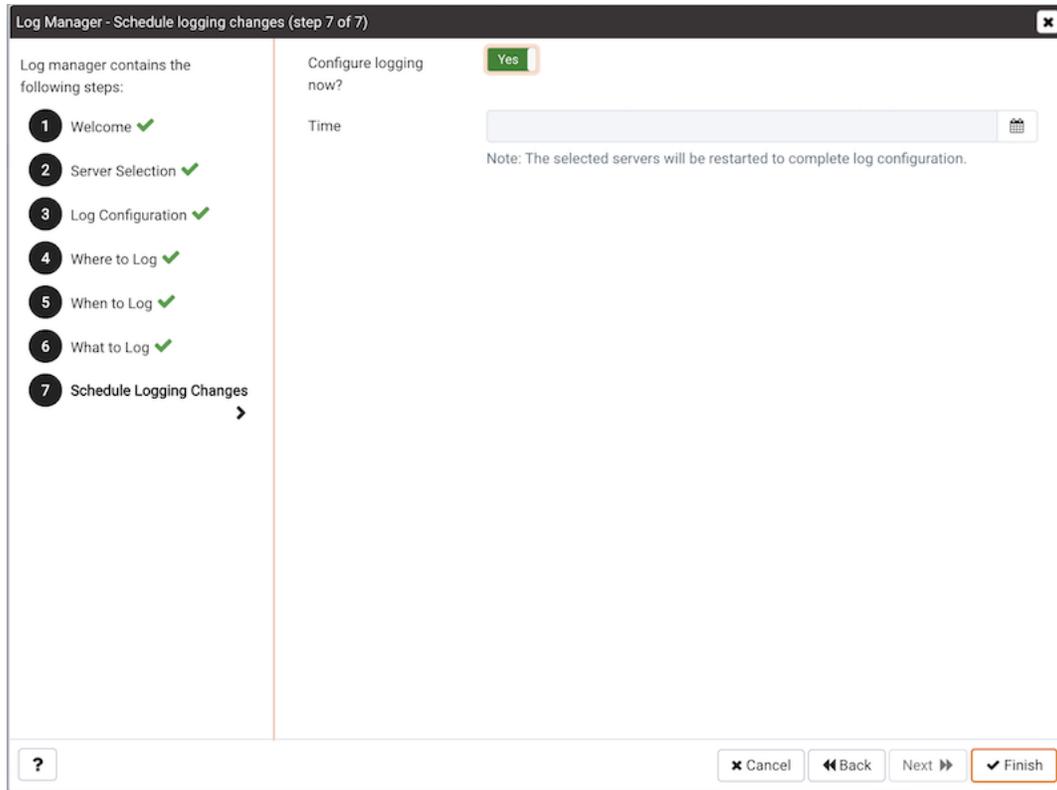


Fig. 7: *The Schedule Logging Changes dialog*

Use options on the `Schedule logging changes` dialog to specify when logging configuration changes will be applied:

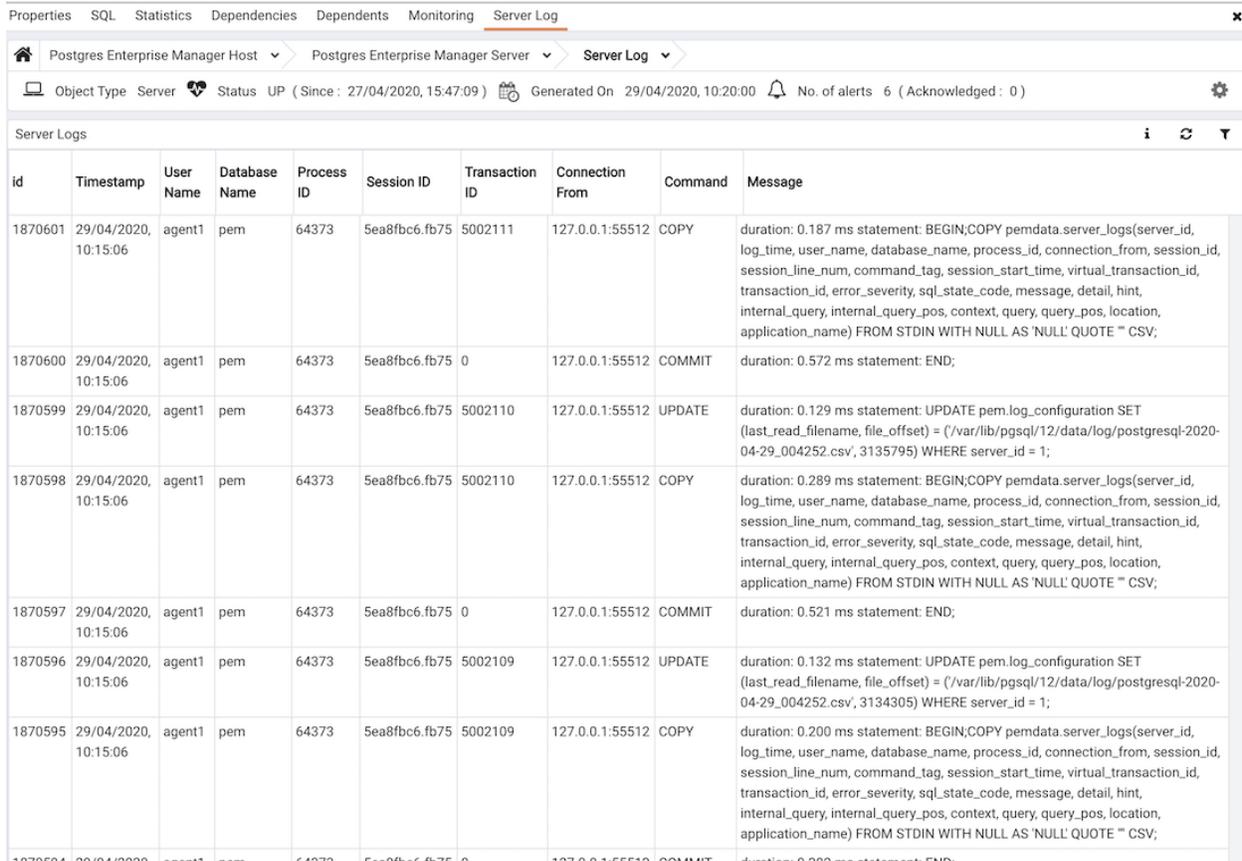
- Set the `Configure logging now` switch to `Yes` to specify that your configuration preferences will be enabled, and the server will restart when you have completed the `Log Manager` wizard.
- Set `Configure logging now` to `No` to use the `Schedule it for some other time` calendar selector to specify a convenient time for logging configuration preferences to be applied, and the server to restart.

Note that when you apply the configuration changes specified by the `Log Manager` wizard, the server restart will temporarily interrupting use of the database server for users.

Click `Finish` to exit the wizard, and either restart the server, or schedule the server restart for the time specified on the scheduling dialog.

7.1 Reviewing the Server Log Analysis Dashboard

After invoking the Log Manager wizard, and importing your log files to PEM, you can use the Server Log Analysis dashboard to review the log files for a selected server. To open the Server Log Analysis dashboard, right-click on the name of a monitored server in the PEM client tree control, and navigate through the Dashboards menu, selecting Server Log Analysis.



| id | Timestamp | User Name | Database Name | Process ID | Session ID | Transaction ID | Connection From | Command | Message |
|---------|----------------------|-----------|---------------|------------|---------------|----------------|-----------------|---------|--|
| 1870601 | 29/04/2020, 10:15:06 | agent1 | pem | 64373 | 5ea8fbc6.fb75 | 5002111 | 127.0.0.1:55512 | COPY | duration: 0.187 ms statement: BEGIN;COPY pemdata.server_logs(server_id, log_time, user_name, database_name, process_id, connection_from, session_id, session_line_num, command_tag, session_start_time, virtual_transaction_id, transaction_id, error_severity, sql_state_code, message, detail, hint, internal_query, internal_query_pos, context, query, query_pos, location, application_name) FROM STDIN WITH NULL AS 'NULL' QUOTE "" CSV; |
| 1870600 | 29/04/2020, 10:15:06 | agent1 | pem | 64373 | 5ea8fbc6.fb75 | 0 | 127.0.0.1:55512 | COMMIT | duration: 0.572 ms statement: END; |
| 1870599 | 29/04/2020, 10:15:06 | agent1 | pem | 64373 | 5ea8fbc6.fb75 | 5002110 | 127.0.0.1:55512 | UPDATE | duration: 0.129 ms statement: UPDATE pem.log_configuration SET (last_read_filename, file_offset) = ('/var/lib/pgsql/12/data/log/postgresql-2020-04-29_004252.csv', 3135795) WHERE server_id = 1; |
| 1870598 | 29/04/2020, 10:15:06 | agent1 | pem | 64373 | 5ea8fbc6.fb75 | 5002110 | 127.0.0.1:55512 | COPY | duration: 0.289 ms statement: BEGIN;COPY pemdata.server_logs(server_id, log_time, user_name, database_name, process_id, connection_from, session_id, session_line_num, command_tag, session_start_time, virtual_transaction_id, transaction_id, error_severity, sql_state_code, message, detail, hint, internal_query, internal_query_pos, context, query, query_pos, location, application_name) FROM STDIN WITH NULL AS 'NULL' QUOTE "" CSV; |
| 1870597 | 29/04/2020, 10:15:06 | agent1 | pem | 64373 | 5ea8fbc6.fb75 | 0 | 127.0.0.1:55512 | COMMIT | duration: 0.521 ms statement: END; |
| 1870596 | 29/04/2020, 10:15:06 | agent1 | pem | 64373 | 5ea8fbc6.fb75 | 5002109 | 127.0.0.1:55512 | UPDATE | duration: 0.132 ms statement: UPDATE pem.log_configuration SET (last_read_filename, file_offset) = ('/var/lib/pgsql/12/data/log/postgresql-2020-04-29_004252.csv', 3134305) WHERE server_id = 1; |
| 1870595 | 29/04/2020, 10:15:06 | agent1 | pem | 64373 | 5ea8fbc6.fb75 | 5002109 | 127.0.0.1:55512 | COPY | duration: 0.200 ms statement: BEGIN;COPY pemdata.server_logs(server_id, log_time, user_name, database_name, process_id, connection_from, session_id, session_line_num, command_tag, session_start_time, virtual_transaction_id, transaction_id, error_severity, sql_state_code, message, detail, hint, internal_query, internal_query_pos, context, query, query_pos, location, application_name) FROM STDIN WITH NULL AS 'NULL' QUOTE "" CSV; |
| 1870504 | 29/04/2020, 10:15:06 | agent1 | pem | 64373 | 5ea8fbc6.fb75 | 0 | 127.0.0.1:55512 | COMMIT | duration: 0.282 ms statement: END; |

Fig. 8: *The Server Log Analysis dashboard*

The header information on the Server Log Analysis dashboard displays the date and time that the server was started, the date and time that the page was last updated, and the current number of triggered alerts.

Entries in the Server Log table are displayed in chronological order, with the most-recent log entries first. Use the scroll bars to navigate through the log entries, or to view columns that are off of the display.

Headings at the top of the server log table identify the information stored in each column; hover over a column heading to view a tooltip that contains a description of the content of each column.

You can use filtering to limit the number of server log records that are displayed. Click Show Filters to expose the filters panel and define a filter.

The screenshot shows the 'Server Log' filter definition window in Postgres Enterprise Manager. The window title is 'Server Log' and it contains a breadcrumb trail: 'Postgres Enterprise Manager Host > Postgres Enterprise Manager Server > Server Log'. Below the breadcrumb, there is a status bar showing 'Object Type: Server', 'Status: UP (Since: 27/04/2020, 15:47:09)', 'Generated On: 29/04/2020, 10:23:01', and 'No. of alerts: 6 (Acknowledged: 0)'. The main area is titled 'Server Logs' and contains a filter definition box with the following fields: 'Start' (2020-04-29 09:22:11), 'End' (2020-04-29 10:22:21), 'User' (postgres), 'Database' (pem), and 'Command type' (empty). There are 'Apply' and 'Reset' buttons at the bottom right of the filter box.

Fig. 9: *Defining a Server Log filter*

Use the fields within the `filter` definition box to describe the selection criteria that PEM will use to select a subset of a report for display:

- Use the `From` field to specify a starting date for the displayed server log.
- Use the `To` field to specify an ending date for the displayed server log.
- Enter a role name in the `Username` field display only transactions performed by that user.
- Enter a database name in the `Database` field to specify that the server should limit the displayed records to only those transactions that were performed against the specified database.
- Use the `Command Type` field to specify a selection criteria for the commands that will be displayed in the filtered report.

When you've described the criteria by which you wish to filter the server logs, click `Filter` to display the filtered server log in the `Server Log` table.

Postgres Log Analysis Expert

The PEM Log Analysis Expert analyzes the log files of servers that are registered with Postgres Enterprise Manager, and produces a report that provides an analysis of your Postgres cluster's usage based on log file entries. You can use information on the Log Analysis Expert reports to make decisions about optimizing your cluster usage and configuration to improve performance.

Before using the PEM Log Analysis Expert, you must specify the Service ID on the Advanced tab of the Server Properties dialog, and use the Log Manager wizard to enable log collection by the PEM server.

To open the `Postgres Log Analysis Expert` wizard, select the `Postgres Log Analysis Expert . . .` option from the Management menu of the PEM client. The wizard's Welcome dialog opens; click Next to continue:

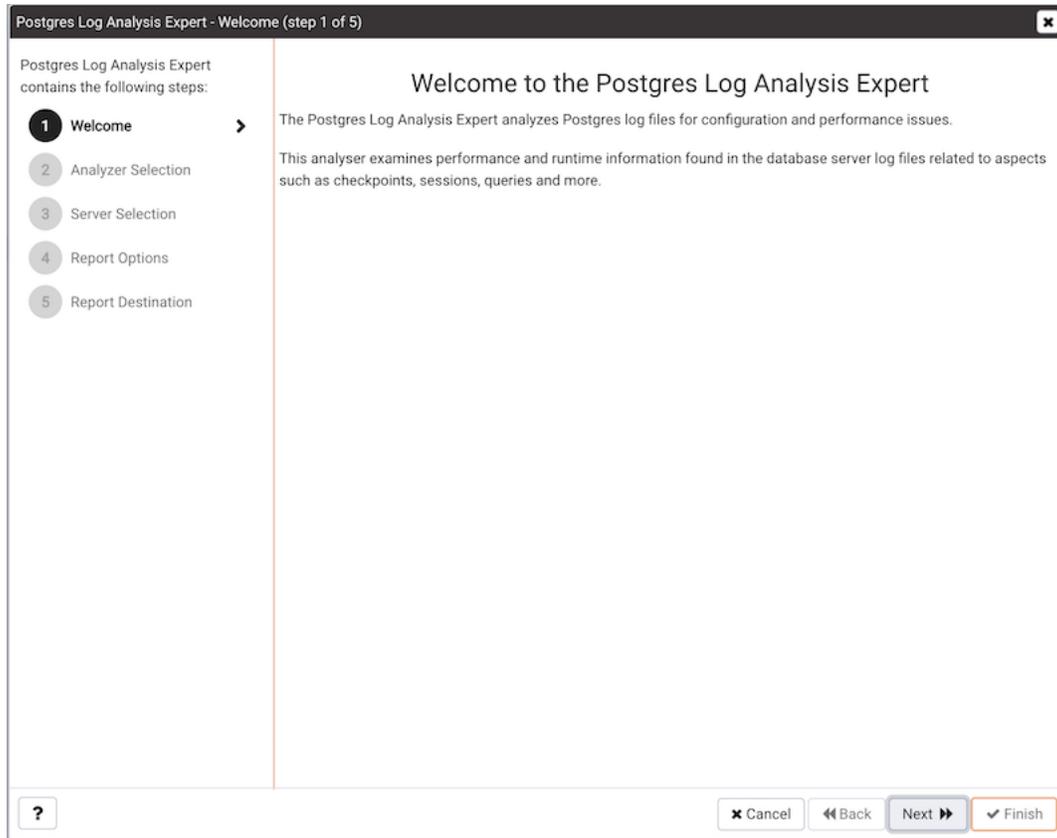


Fig. 1: *The Log Analysis Expert Welcome dialog*

The wizard's `Analyzer` selection dialog displays a list of Analyzers from which you can select. Each Analyzer generates a corresponding table, chart, or graph that contains information gleaned from the log files.

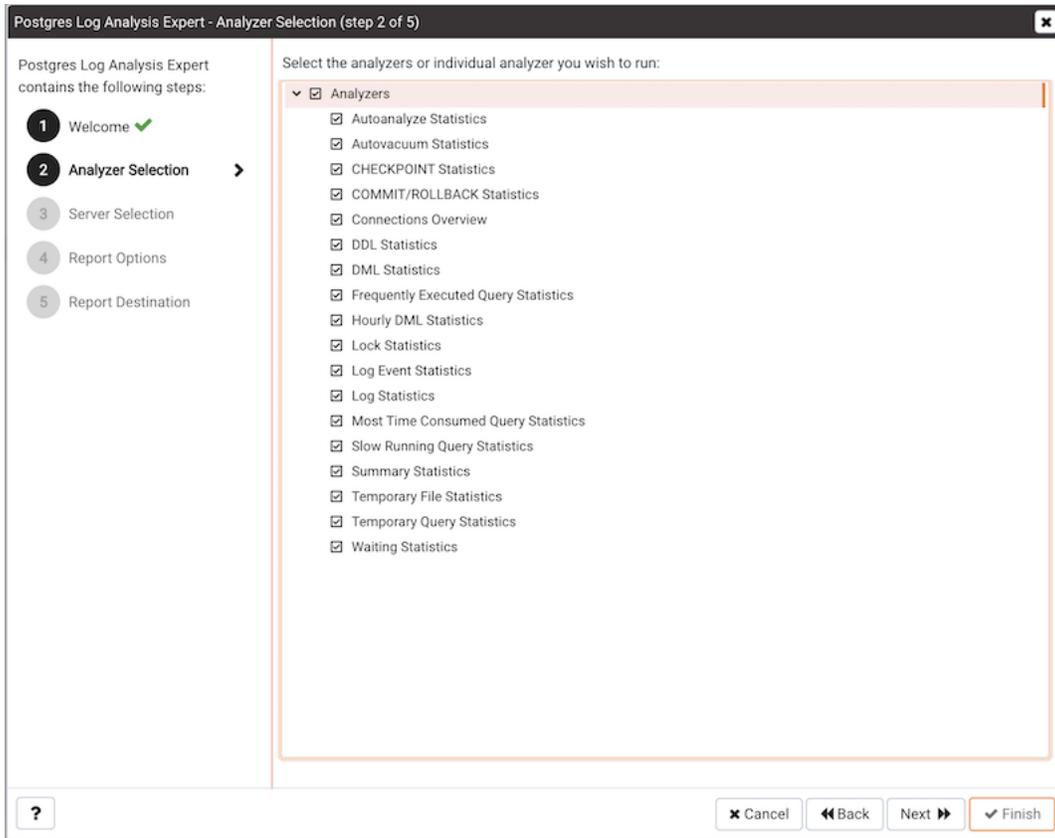


Fig. 2: *The Analyzer selection dialog*

Check the box to the left of an Analyzer to indicate that the Log Analysis Expert should prepare the corresponding table, chart or graph. After making your selections, click `Next` to continue to the Server selection tree control.

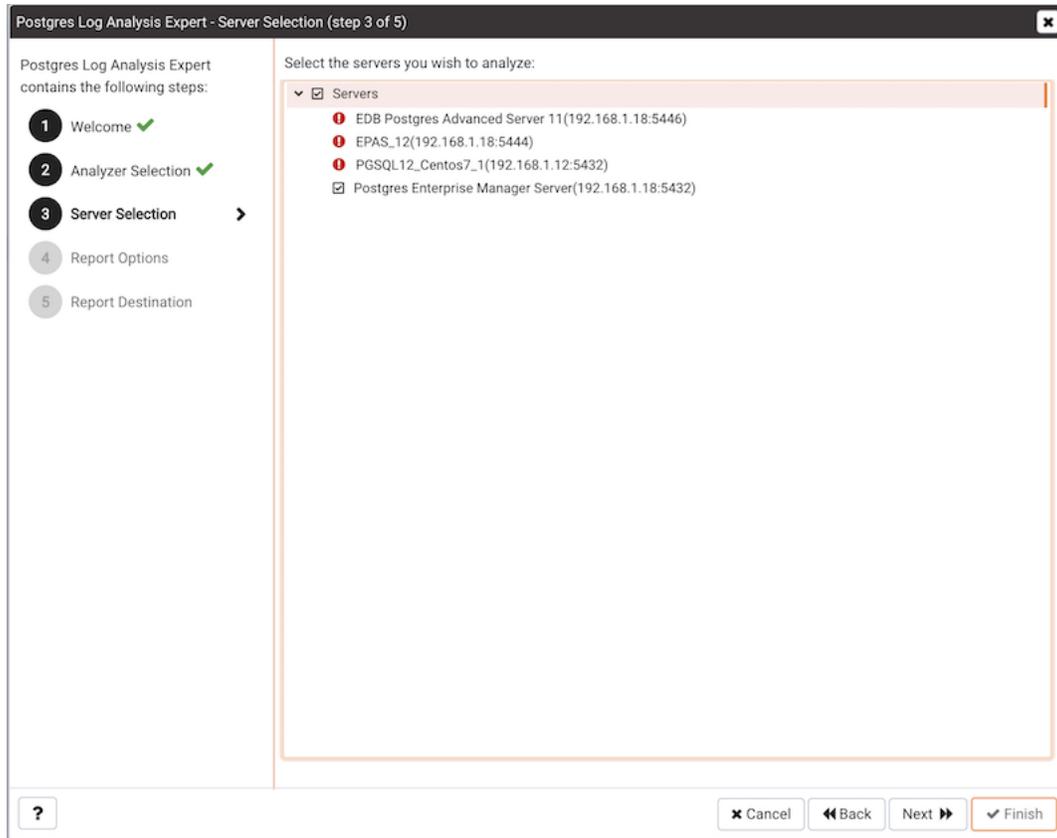


Fig. 3: *The Server selection dialog*

Use the tree control to specify which servers you would like the Postgres Log Analysis Expert to analyze. If you select multiple servers, the resulting report will contain the corresponding result set for each server in a separate (but continuous) list. Click `Next` to continue to the Report options dialog.

Fig. 4: *The Report options dialog*

Use the fields in the `Options` section to specify the analysis method and the maximum length of any resulting tables:

- Use the `Aggregate method` drop-down to select the method used by the Log Analysis Expert to consolidate data for the selected time span. You can select from:
 - `SUM` instructs the analyzer to calculate a value that is the sum of the collected values for the specified time span.
 - `AVG` instructs the analyzer to calculate a value that is the average of the collected values for the specified time span.
 - `MAX` instructs the analyzer to use the maximum value that occurs within a specified time span.
 - `MIN` instructs the analyzer to use the minimum value that occurs within a specified time span.
- Use the `Time span` field to specify the number of minutes that the analyzer will incorporate into each calculation for a point on a graph. For example, if the `Time span` is 5 minutes, and the `Aggregate method` is `AVG`, each point on the given graph will contain the average value of the activity that occurred within a five minute time span.
- Use the `Rows limit` field to specify the maximum number of rows to include in a table.

Use the fields in the `Time Intervals` section to specify the time range that the Log Analysis Expert will analyze:

- Set `Relative days` to `Yes` to enable the `(+/-)From date` field and specify the number of days before or after the date and time selected in the `From` field.
- Use the `From` field to specify the starting date and time for the analysis.

- Use the `To` field to specify the ending date and time for the analysis.
- Use the `(+/-)` From date selector to specify the number of days before or after the From date that should be included in the analysis.

When you've specified the report options, click `Next` to continue to the Report destination dialog.

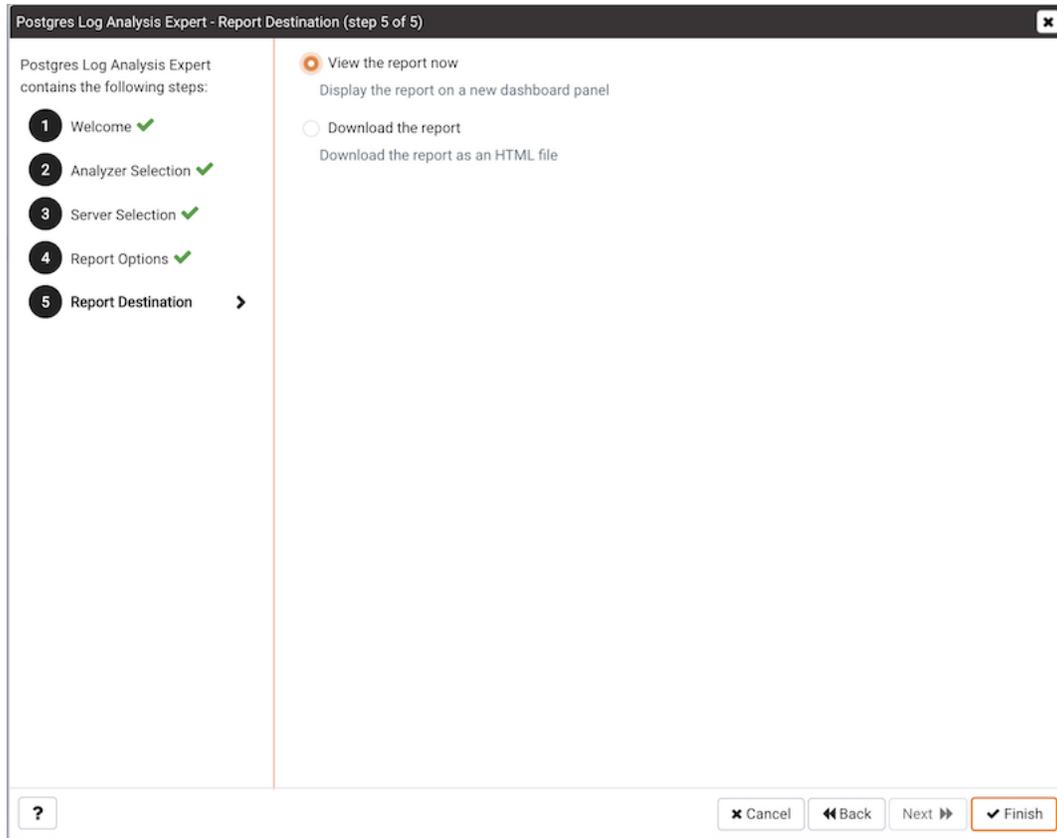


Fig. 5: *The Report destination dialog*

You can choose the default option and select `Finish` to view the Log Analysis Expert report in the PEM client's tabbed browser, or click the radio button next to `Download the report` to save a copy of the report to an HTML file for later use.

If you have specified that the report should be saved to a file, the report will be downloaded.

8.1 Reviewing the Postgres Log Analysis Expert Report

If you've elected to review the report immediately, the Postgres Log Analysis Expert report will be displayed in the PEM Client window. The report header displays the date and time that the report was generated, the time period that the report spans, and the aggregation method specified when defining the report. The name of the server for which information is displayed is noted at the start of each section of the report.

The report displays the tables, graphs and charts that were selected in the Log Analysis Expert wizard. Use the **Jump To** button (located in the lower-right hand corner of the screen) to navigate to a specific graphic.

| Postgres Log Analysis Expert | | | | | | |
|---|---------------|--------------------------------------|-------|-----------------|--------------|---|
| Interval: 2020-4-20 15:55:19 - 2020-4-27 15:55:19 | | Generated: 2020-04-27 16:00:51 | | Span: 5 Minutes | | Aggregate: SUM |
| | | | | | | Go to: Postgres Enterprise Manager Server |
| Postgres Enterprise Manager Server(192.168.1.18:5432) | | | | | | |
| Summary Statistics | | | | | | |
| Settings | | Values | | | | |
| Number of unique queries | | 151649 | | | | |
| Total queries | | 155045 | | | | |
| Total queries duration | | | | | | |
| First query | | 27/04/2020 15:47:09.86 IST | | | | |
| Last query | | 27/04/2020 15:53:59.611 IST | | | | |
| Queries peak time | | 27/04/2020 15:49:38 IST queries 2821 | | | | |
| Number of events | | 155045 | | | | |
| Number of unique events | | 1 | | | | |
| Total number of sessions | | 348 | | | | |
| Total duration of sessions | | | | | | |
| Average sessions duration | | | | | | |
| Total number of connections | | 0 | | | | |
| Total number of databases | | 0 | | | | |
| Hourly DML Statistics | | | | | | |
| Time | Database name | Statement | Count | Min duration | Max duration | Avg duration |
| 27/04/2020 15:00 | db01 | SELECT | 80 | 0.05 | 105.40 | 4.90 |
| 27/04/2020 15:00 | edbstore_temp | SELECT | 58 | 0.02 | 66.58 | 4.64 |
| 27/04/2020 15:00 | hr | SELECT | 48 | 0.01 | 29.26 | 1.87 |
| 27/04/2020 15:00 | pem | COPY | 1641 | 0.65 | 43.81 | 2.08 |
| 27/04/2020 15:00 | pem | DELETE | 73 | 0.44 | 8.74 | 1.04 |
| 27/04/2020 15:00 | pem | INSERT | 190 | 0.06 | 9.50 | 2.19 |

Fig. 6: The Postgres Log Analysis Expert Report

If the report contains an analysis of more than one monitored server, charts and tables will be displayed in sets; first the graphs, tables and charts that display statistics for one server, then the graphics for the next server in the report.

SQL Profiling and Analysis

Most RDBMS experts agree that inefficient SQL code is the leading cause of most database performance problems. The challenge for DBAs and developers is to locate the poorly-running SQL code in large and complex systems, and then optimize that code for better performance.

The SQL Profiler component allows a database superuser to locate and optimize poorly-running SQL code. Users of Microsoft SQL Server's Profiler will find PEM's SQL Profiler very similar in operation and capabilities. SQL Profiler is installed with each Advanced Server instance; if you are using PostgreSQL, you must download the SQL Profiler installer, and install the SQL Profiler product into each managed database instance you wish to profile.

For each database monitored by SQL Profiler, you must:

1. Edit the `postgresql.conf` file; you must include the SQL Profiler library in the `shared_preload_libraries` configuration parameter.

For Linux installations, the parameter value should include:

```
$libdir/sql-profiler
```

on Windows, the parameter value should include:

```
$libdir/sql-profiler.dll
```

2. Create the functions used by SQL Profiler in your database. The SQL Profiler installation program places a SQL script (named `sql-profiler.sql`) in the `share/postgresql/contrib` subdirectory of the main PostgreSQL installation directory on Linux systems. On Windows systems, this script is located in the `share` subdirectory. You must invoke this script on the maintenance database specified when registering the server with PEM.
3. Stop and re-start the server for the changes to take effect.

Please note: if you have connected to the PEM server with the PEM client before configuring SQL Profiler, you must disconnect and reconnect with the server to enable SQL Profiler functionality. For more detailed information about installing and configuring the SQL Profiler plugin, please refer to the PEM Installation Guide, available from the EnterpriseDB website at:

<http://enterprisedb.com/products-services-training/products/documentation>

9.1 Creating a New SQL Trace

SQL Profiler captures and displays a specific SQL workload for analysis in a SQL trace. You can start and review captured SQL traces immediately, or save captured traces for review at a later time. You can use SQL Profiler to create and store up to 15 named traces; use menu options to create and manage traces.

9.1.1 Creating a Trace

You can use the `Create trace...` dialog to define a SQL Trace for any database on which SQL Profiler has been installed and configured. To access the dialog, highlight the name of the database in the PEM client tree control; navigate through the Management menu to the SQL Profiler pull-aside menu, and select `Create trace...`

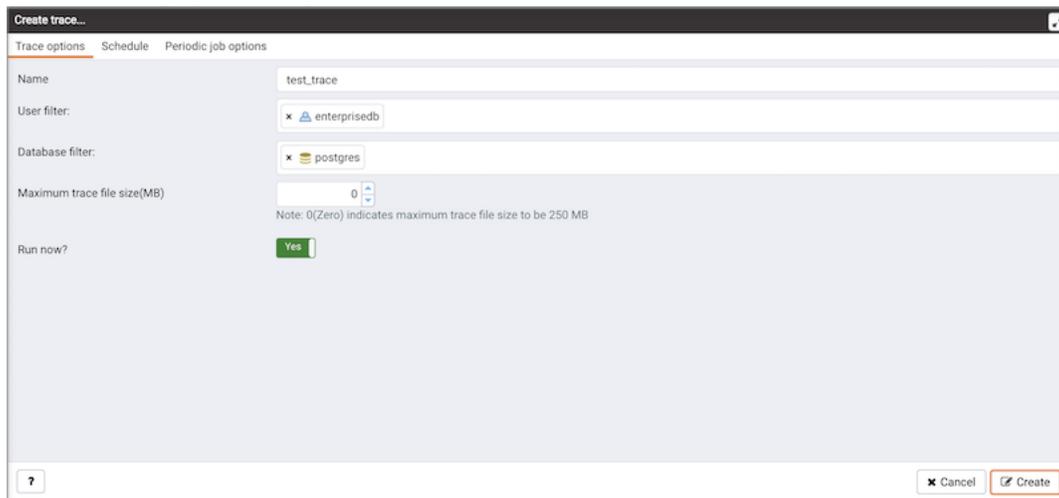


Fig. 1: *The Trace options tab*

Use the fields on the `Trace options` tab to specify details about the new trace:

- Provide a name for the trace in the `Name` field.
- Click in the `User filter` field to specify the roles whose queries will be included the trace; optionally, check the box next to `Select All` to include queries from all roles.
- Click in the `Database filter` field to specify which databases to trace; optionally, check the box next to `Select All` to include queries against all databases.
- Specify a trace size in the `Maximum Trace File Size` field; SQL Profiler will terminate the trace when it reaches approximately the size specified.
- Specify `Yes` in the `Run Now` field to start the trace when you select the `Create` button; select `No` to enable fields on the `Schedule` tab.

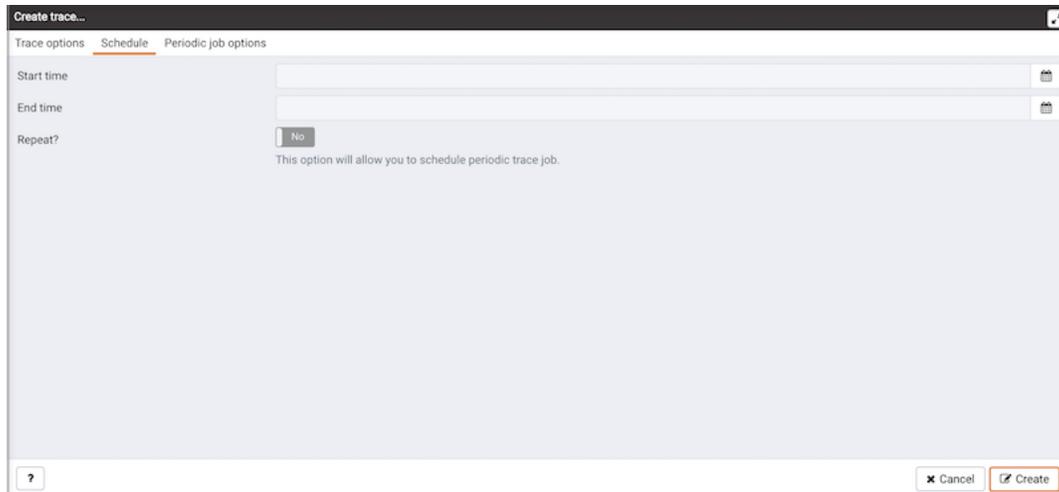


Fig. 2: The Create trace Schedule tab

Use the fields on the `Schedule` tab to specify scheduling details for the new trace:

- Use the `Start time` field to specify the starting time for the trace.
- Use the `End time` field to specify the ending time for the trace.
- Specify `Yes` in the `Repeat?` field to indicate that the trace should be repeated every day at the times specified; select `No` to enable fields on the `Periodic job options` tab.

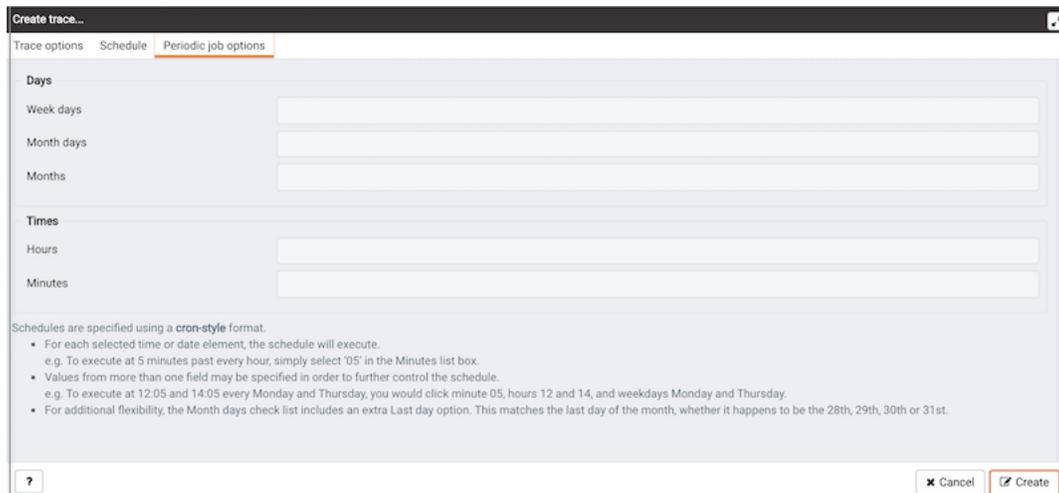


Fig. 3: The Create trace Periodic job options tab

Fields on the `Periodic job options` tab specify scheduling details about a recurring trace. Use fields in the `Days` section to specify the days on which the job will execute:

- Click in the `Week days` field to select the days of the week on which the trace will execute.
- Click in the `Month days` field to select the days of the month on which the trace will execute.
- Click in the `Months` field to select the months in which the trace will execute.

Use fields in the `Times` section to specify a time schedule for the trace execution:

- Click in the `Hours` field to select the hours at which the trace will execute.
- Click in the `Minutes` field to select the hours at which the trace will execute.

When you've completed the `Create trace . . .` dialog, click `Create` to start the newly defined trace or to schedule the trace for a later time.

| # | Start Time | Duration (ms) | Query | Rows Affected | User | Database | PID | File System Read | File System Write | Page Fault |
|----|-------------------------------|---------------|----------------------------|---------------|--------------|----------|-------|------------------|-------------------|------------|
| 1 | 2020-04-24 01:54:57.556323-07 | 1.273133 | SELECT heartbeat_inte... | 1 | agent1 | perm | 91666 | 48 | 0 | 6 |
| 2 | 2020-04-24 01:54:57.627954-07 | 12.234771 | /pgdash/ SELECT ... | 5 | enterprisedb | postgres | 33485 | 0 | 0 | 0 |
| 3 | 2020-04-24 01:54:57.647487-07 | 0.00245 | SELECT 1 | 1 | enterprisedb | perm | 30543 | 0 | 0 | 0 |
| 4 | 2020-04-24 01:54:57.659666-07 | 0.004035 | SELECT pg_has_role(p... | 1 | enterprisedb | perm | 30543 | 0 | 0 | 0 |
| 5 | 2020-04-24 01:54:57.660344-07 | 0.00083 | SELECT 1 | 1 | enterprisedb | perm | 30543 | 0 | 0 | 0 |
| 6 | 2020-04-24 01:54:57.69993-07 | 0.917116 | SET DateStyle=ISO, SE... | 1 | enterprisedb | postgres | 33900 | 0 | 0 | 0 |
| 7 | 2020-04-24 01:54:57.696903-07 | 0.016561 | SELECT db_oid as did, ... | 1 | enterprisedb | postgres | 33900 | 0 | 0 | 0 |
| 8 | 2020-04-24 01:54:57.69824-07 | 0.027168 | SELECT oid as id, rolna... | 1 | enterprisedb | postgres | 33900 | 0 | 0 | 0 |
| 9 | 2020-04-24 01:54:58.633668-07 | 12.019085 | /pgdash/ SELECT ... | 5 | enterprisedb | postgres | 33485 | 0 | 0 | 0 |
| 10 | 2020-04-24 01:54:58.814973-07 | 0.001999 | SELECT 1 | 1 | enterprisedb | perm | 30543 | 0 | 0 | 0 |
| 11 | 2020-04-24 01:54:58.826576-07 | 0.050517 | SELECT pg_has_role(p... | 23 | enterprisedb | perm | 30543 | 0 | 0 | 0 |
| 12 | 2020-04-24 01:54:59.622713-07 | 11.296904 | /pgdash/ SELECT ... | 5 | enterprisedb | postgres | 33485 | 0 | 0 | 0 |
| 13 | 2020-04-24 01:55:00.137269-07 | 0.001639 | SELECT 1 | 1 | enterprisedb | postgres | 32578 | 0 | 0 | 0 |
| 14 | 2020-04-24 01:55:01.250787-07 | 11.271025 | /pgdash/ SELECT ... | 5 | enterprisedb | postgres | 33485 | 0 | 0 | 0 |
| 15 | 2020-04-24 01:55:02.114481-07 | 0.627253 | WITH agent_info AS (... | 1 | agent1 | perm | 91666 | 680 | 0 | 52 |
| 16 | 2020-04-24 01:55:02.236089-07 | 12.07968 | /pgdash/ SELECT ... | 5 | enterprisedb | postgres | 33485 | 0 | 0 | 0 |
| 17 | 2020-04-24 01:55:02.628516-07 | 13.478983 | SELECT * FROM (SEL... | 3 | agent1 | perm | 91666 | 1568 | 0 | 49 |
| 18 | 2020-04-24 01:55:03.232281-07 | 0.049985 | SELECT * FROM pem_j... | 1 | agent1 | perm | 91666 | 0 | 0 | 0 |
| 19 | 2020-04-24 01:55:03.235696-07 | 0.011202 | SELECT nextval(pem_j... | 1 | agent1 | perm | 91666 | 0 | 0 | 0 |
| 20 | 2020-04-24 01:55:03.239847-07 | 18.327522 | /pgdash/ SELECT ... | 5 | enterprisedb | postgres | 33485 | 0 | 0 | 0 |
| 21 | 2020-04-24 01:55:03.243198-07 | 0.128994 | INSERT INTO pem_jobs... | 1 | agent1 | perm | 91666 | 32 | 0 | 1 |
| 22 | 2020-04-24 01:55:03.263871-07 | 0.03972 | SELECT log_directory... | 1 | agent1 | perm | 91666 | 0 | 0 | 0 |

SQL Query Metrics

Graphical Plan Text-Based Plan

Graphical Analysis Statistics

Function Scan

Fig. 4: The `SQL Profiler` tab, displaying the trace results

If you elect to execute the trace immediately, the trace results will display in the PEM client.

9.1.2 Opening an Existing Trace

To view a previous trace, highlight the name of the profiled database in the PEM client tree control; navigate through the Management menu to the SQL Profiler pull-aside menu, and select `Open trace...`. You can also use the SQL Profiler toolbar menu to open a trace; select the `Open trace...` option. The `Open trace...` dialog opens.

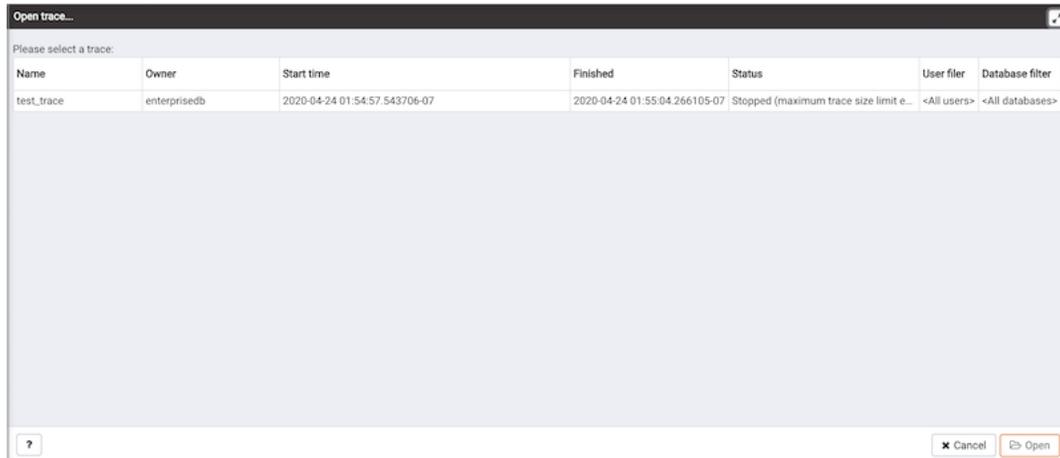


Fig. 5: *Opening an existing trace*

Highlight an entry in the trace list and click `Open` to open the selected trace. The selected trace opens in the SQL Profiler tab.

9.1.3 Filtering a Trace

A filter is a named set of (one or more) rules, each of which can hide events from the trace view. When you apply a filter to a trace, the hidden events are not removed from the trace, but are merely excluded from the display.

Click the Filter icon to open the `Trace Filter` dialog and create a rule (or set of rules) that define a filter. Each rule will screen the events within the current trace based on the identity of the role that invoked the event, or the query type invoked during the event.

To open an existing filter, select the `Open` button; to define a new filter, click the `Add (+)` icon to add a row to the table displayed on the `General` tab and provide rule details:

- Use the `Type` drop-down listbox to specify the trace field that the filter rule will apply to.
- Use the `Condition` drop-down listbox to specify the type of operator that SQL Profiler will apply to the `Value` when it filters the trace:
 - Select `Matches` to filter events that contain the specified `Value`.
 - Select `Does not match` to filter events that do not contain the specified `Value`.
 - Select `Is equal to` to filter events that contain an exact match to the string specified in the `Value` field.
 - Select `Is not equal to` to filter events that do not contain an exact match to the string specified in the `Value` field.
 - Select `Starts with` to filter events that begin with the string specified in the `Value` field.
 - Select `Does not start with` to filter events that do not begin with the string specified in the `Value` field.
 - Select `Less than` to filter events that have a numeric value less than the number specified in the `Value` field.
 - Select `Greater than` to filter events that have a numeric value greater than the number specified in the `Value` field.
 - Select `Less than or equal to` to filter events that have a numeric value less than or equal to the number specified in the `Value` field.
 - Select `Greater than or equal to` to filter events that have a numeric value greater than or equal to the number specified in the `Value` field.
- Use the `Value` field to specify the string, number or regular expression that SQL Profiler will search for.

When you've finished defining a rule, click the `Add (+)` icon to add another rule to the filter. To delete a rule from a filter, highlight the rule and click the `Delete` icon.

Click the `Save` button to save the filter definition to a file without applying the filter; to apply the filter, click `OK`. Select `Cancel` to exit the dialog and discard any changes to the filter.

9.1.4 Deleting a Trace

To delete a trace, highlight the name of the profiled database in the PEM client tree control; navigate through the Management menu to the SQL Profiler pull-aside menu, and select `Delete trace(s) . . .`. You can also use the SQL Profiler toolbar menu to delete a trace; select the `Delete trace(s) . . .` option. The `Delete traces` dialog opens.

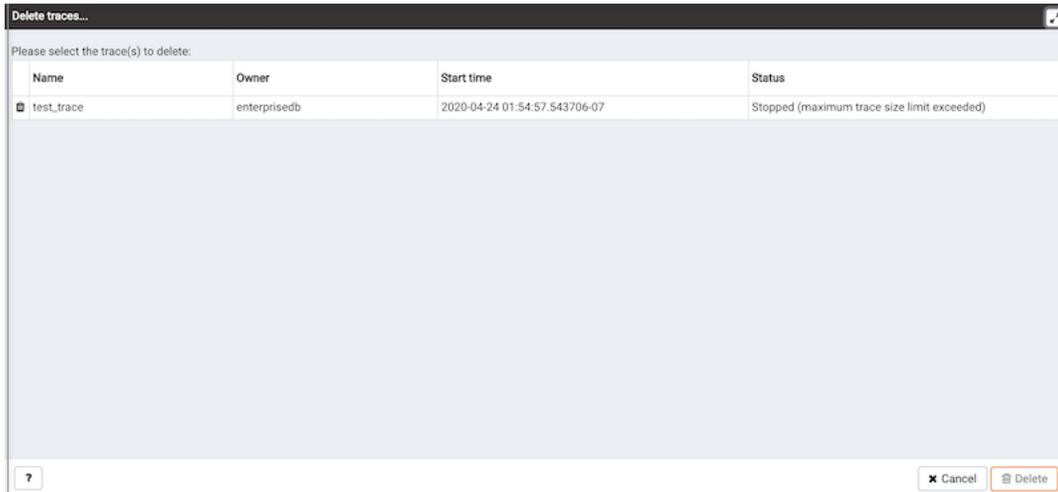


Fig. 6: *The Delete traces. . . dialog*

Click the icon to the left of a trace name to mark one or more traces for deletion and click `Delete`. The PEM client will acknowledge that the selected traces have been deleted.

9.1.5 Viewing Scheduled Traces

To view a list of scheduled traces, highlight the name of the profiled database in the PEM client tree control; navigate through the `Management` menu to the `SQL Profiler` pull-aside menu, and select `Scheduled traces...` You can also use the `SQL Profiler` toolbar menu to the list; select the `Scheduled traces...` option.

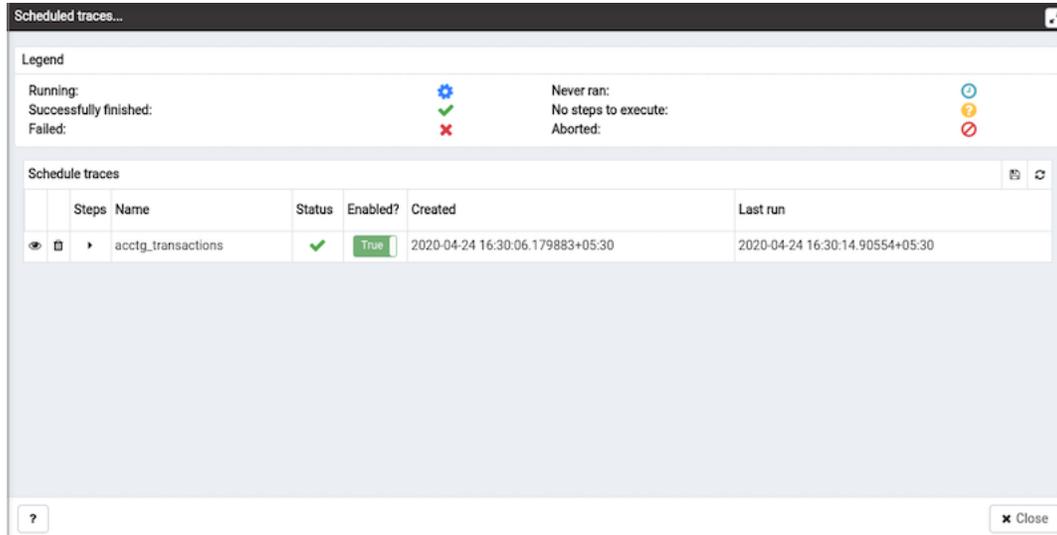


Fig. 7: Reviewing scheduled traces

The `Scheduled traces...` dialog displays a list of the traces that are awaiting execution. Click the edit button to the left of a trace name to access detailed information about the trace:

- The `Status` field lists the status of the current trace.
- The `Enabled?` switch displays `Yes` if the trace is enabled; `No` if it is disabled.
- The `Name` field displays the name of the trace.
- The `Agent` field displays the name of the agent responsible for executing the trace.
- The `Last run` field displays the date and time of the last execution of the trace.
- The `Next run` field displays the date and time of the next scheduled trace.
- The `Created` field displays the date and time that the trace was defined.

9.2 Using the Index Advisor

Index Advisor is distributed with [supported versions](#) of Advanced Server. Index Advisor works with SQL Profiler by examining collected SQL statements and making indexing recommendations for any underlying tables to improve SQL response time. The Index Advisor works on all DML (INSERT, UPDATE, DELETE) and SELECT statements that are invoked by a superuser.

Diagnostic output from the Index Advisor includes:

- Forecasted performance benefits from any recommended indexes
- The predicted size of any recommended indexes
- DDL statements you can use to create the recommended indexes

Before using Index Advisor, you must:

1. Modify the `postgresql.conf` file on each Advanced Server host, adding the `index_advisor` library to the `shared_preload_libraries` parameter.
2. Install the `Index Advisor contrib` module. To install the module, use the `psql` client or PEM Query Tool to connect to the database, and invoke the following command:

```
\i <complete_path>/share/contrib/index_advisor.sql
```

3. Restart the server for your changes to take effect.

Index Advisor can make indexing recommendations based on trace data captured by SQL Profiler. Simply highlight one or more queries in the `SQL Profiler Trace Data` pane, and click the `Index Advisor` toolbar button (or select `Index Advisor` from the `View` menu). For detailed usage information about Index Advisor, please see the `EDB Postgres Advanced Server Guide`.

Please note: Index Advisor cannot analyze statements invoked by a non-superuser. If you attempt to analyze statements invoked by a non-superuser, the server log will include the following error:

```
ERROR: access to library "index_advisor" is not allowed
```

For more information about configuring and using Index Advisor, please see the `EDB Postgres Advanced Server Guide`, available from EnterpriseDB at:

<https://www.enterprisedb.com/resources/product-documentation>

CHAPTER 10

Tuning Wizard

The Tuning Wizard reviews your PostgreSQL or Advanced Server installation, and recommends a set of configuration options that will help tune the installation to best suit its anticipated workload. Please note that benchmarking systems or systems with a high work load may require additional manual tuning to reach optimum performance.

Before using the Tuning Wizard, you must specify the name of the service in the Service ID field on the Advanced tab of the server's Properties dialog. PEM will use the service name when restarting the service after tuning.

The Tuning Wizard can only make recommendations for those servers that reside on the same server as their bound PEM agent. If you have specified a value of Yes in the Remote monitoring field when defining your server, the server will not be displayed in the Tuning Wizard tree control.

To open the Tuning Wizard, select `Tuning Wizard...` from the `Management` menu of the PEM client. The Tuning Wizard opens, welcoming you.

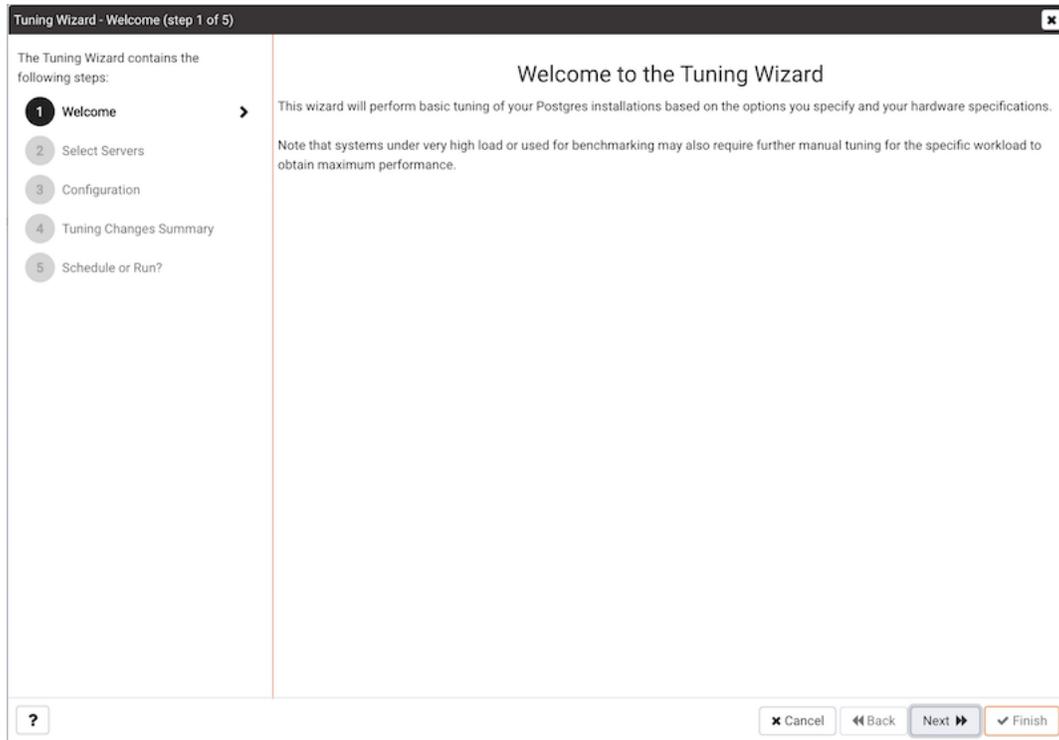


Fig. 1: *The Tuning Wizard Welcome dialog*

Click Next to continue to the server selection dialog.

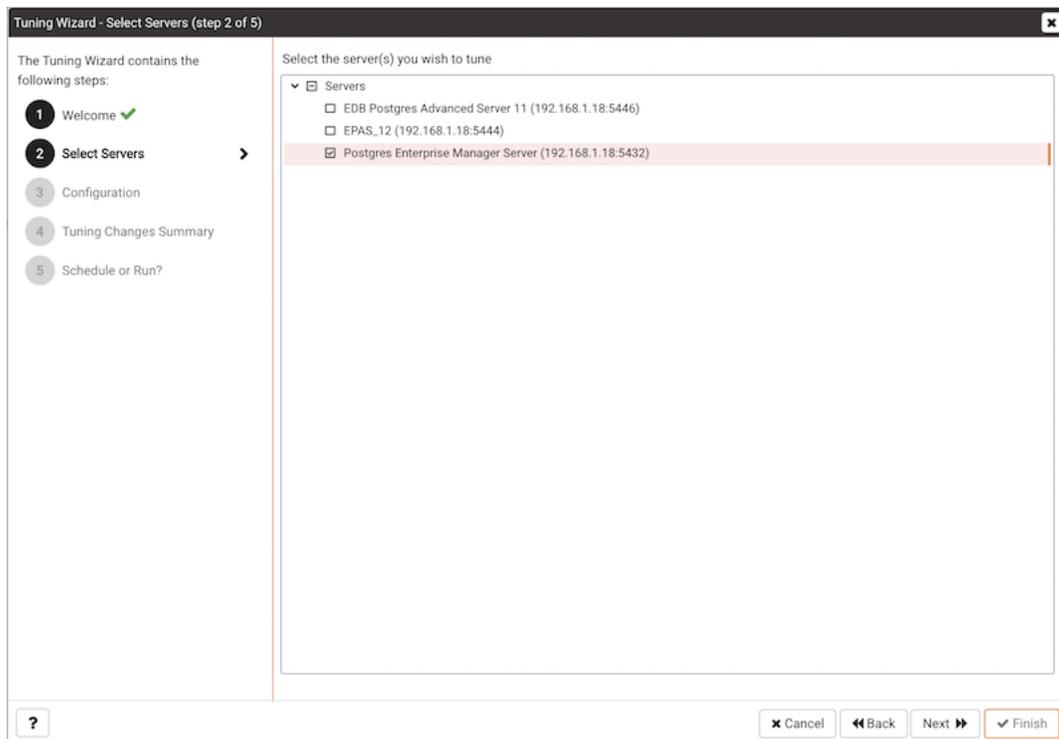


Fig. 2: *The Select Servers dialog*

Expand the `Servers` node of the tree control to view a list of the servers that are currently monitored by PEM that are available for tuning. Check a box to the left of a server name to select the server for tuning.

Note: the Tuning Wizard displays a red warning symbol to the left of a server name in the tree control if the service name for that server is not provided on the server's Properties dialog.

Click `Next` to continue to the Configuration dialog.

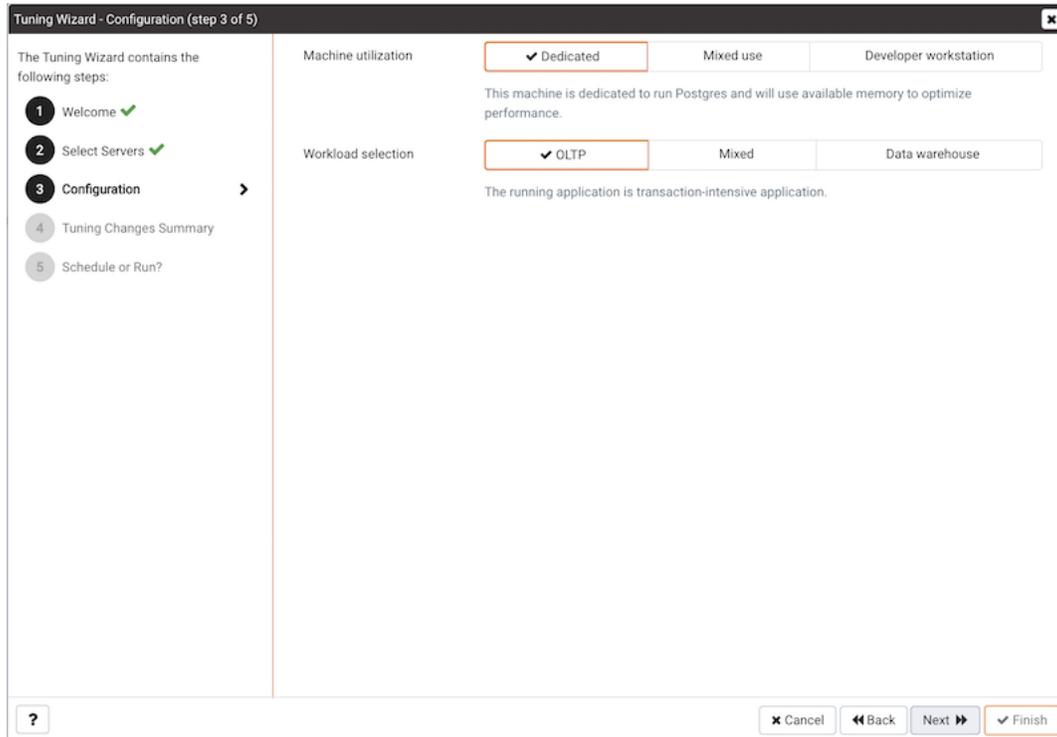


Fig. 3: *The Configuration dialog*

Select an option in the `Machine utilization` field to specify the type of work performed by the selected servers. The type of work performed by the server determines how the tuning wizard will allocate system resources:

- Select `Dedicated` to dedicate the majority of the system resources to the database server.
- Select `Mixed use` to dedicate a moderate amount of system resources to the database server.
- Select `Developer workstation` to dedicate a relatively small amount of system resources to the database server.

Select an option in the `Workload Selection` field to specify the type of workload typically performed on the selected server:

- Select `OLTP` if the selected server is used primarily to process online transaction workloads.
- Select `Mixed` if the selected server provides a mix of transaction processing and data reporting.
- Select `Data warehouse` if the server is used for heavy data reporting.

Click `Next` to continue to the `Tuning Changes Summary` dialog.

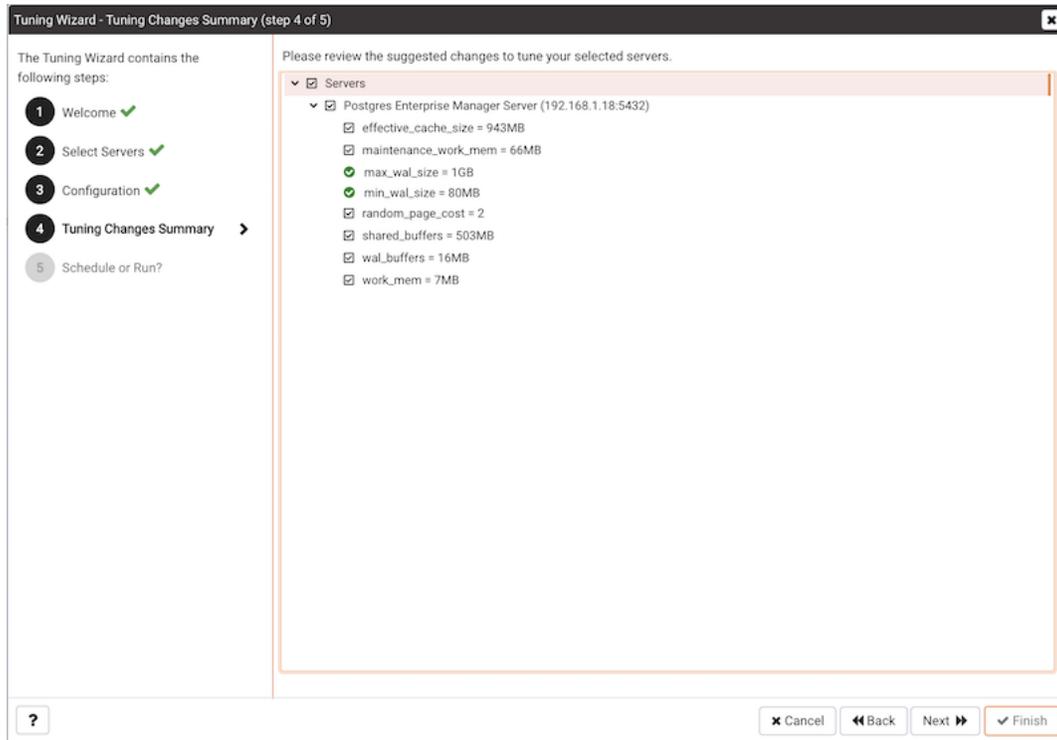


Fig. 4: *The Tuning Changes Summary dialog*

The tree control on the `Tuning Changes Summary` dialog displays the parameter setting modifications recommended for each server analyzed by the Tuning Wizard. Use the checkboxes next to a server or parameter name to select the recommendations that tuning wizard will either include in a preview report or apply:

- A checked box to the left of a parameter name specifies that the Tuning Wizard will include the parameter setting.
- A checked box to the left of a server name specifies that the Tuning Wizard will include all parameter setting recommendations for the specified server.

Specify which Tuning Wizard recommendations you wish to include in a report or apply, and click `Next` to continue.

Use the `Schedule or Run?` dialog to either specify a time that PEM will apply the changes, or generate a report that details the recommended changes.

The selected actions will apply to all of the changes noted on the Tuning Changes Summary. If you opt to generate a report, PEM will create a report that contains a list of the current values and recommended modifications to the configuration parameters selected on the Tuning Changes Summary dialog. Note that to implement changes, you will need to invoke the Tuning Wizard a second time, specifying the parameters you wish to modify on the Tuning Changes Summary dialog.

Select `Schedule` changes to view and specify your scheduling options.

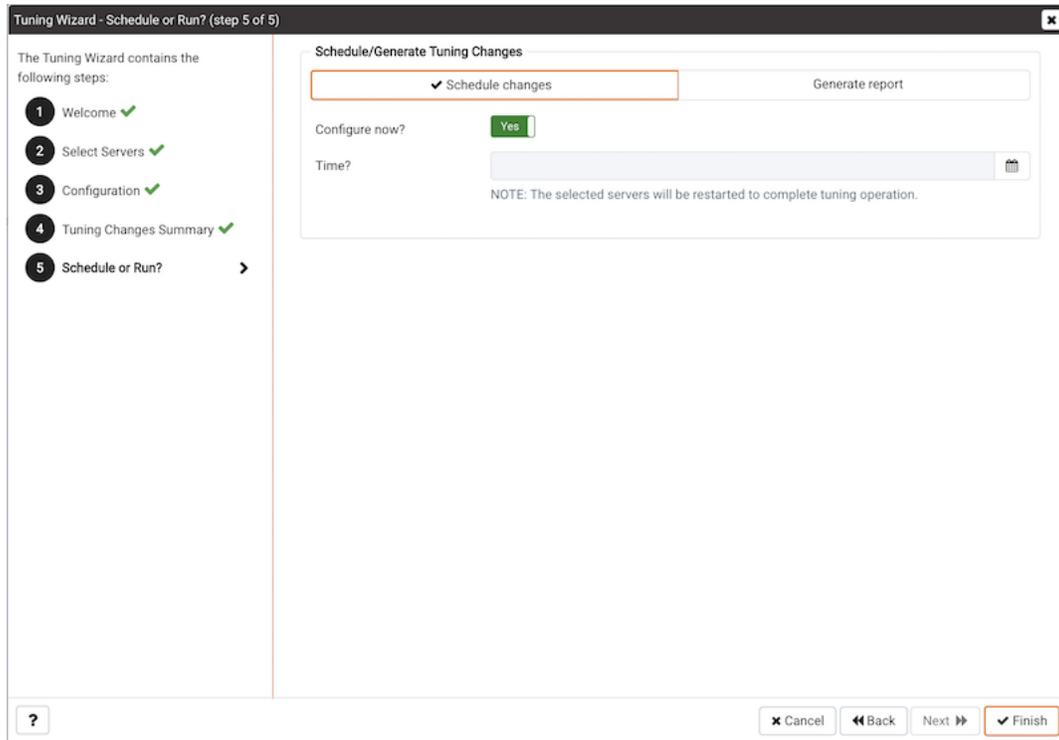


Fig. 5: The Schedule or Run? dialog

You can:

- Set the `Configuration now?` slider to `Yes` to apply the tuning wizard's recommendations and restart the server now.
- Set the `Configuration now?` slider to `No` to enable the `Time?` field and use the calendar selector to specify a time for PEM to apply the tuning wizard's recommendations and restart the server. Note that if you schedule a time for the changes to be applied, you will not be provided with a preview of the change recommendations.

Select `Generate report` to view your report options.

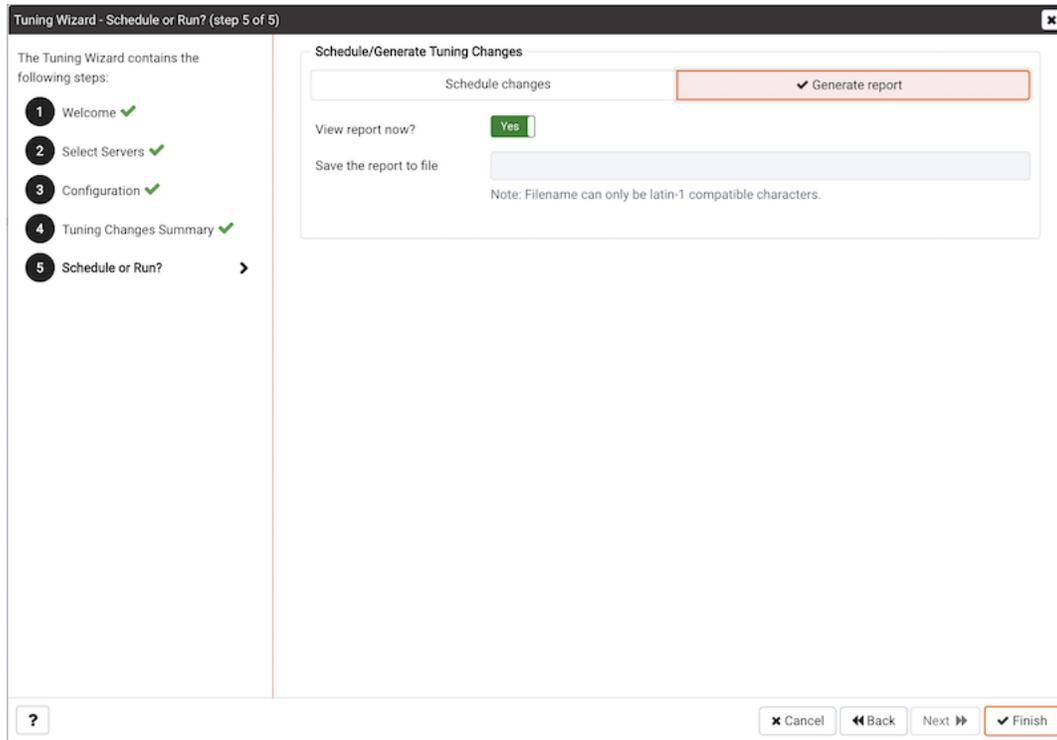


Fig. 6: The Schedule or Run? dialog

You can:

- Set the `View report now?` slider to `Yes` to display the Tuning Wizard report onscreen.
- Set the `View report now?` slider to `No` to enable the `Save the report to file` field and use the calendar selector to specify a file name and location to which PEM will write the Tuning Wizard report.

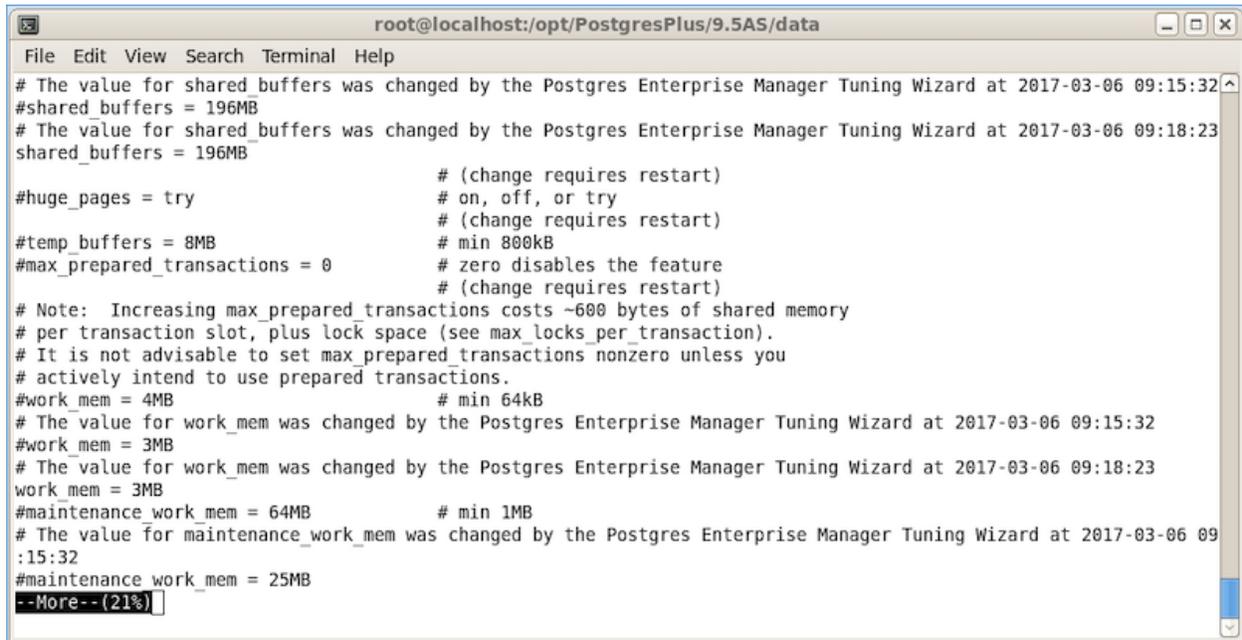
Click the `Finish` button to either apply the Tuning Wizard's modifications or generate a report and exit the Tuning Wizard.

| GUC Parameter | Original Value | Recommended Value |
|----------------------|----------------|-------------------|
| effective_cache_size | 4096MB | 943MB |
| maintenance_work_mem | 64MB | 66MB |
| random_page_cost | 4 | 2 |
| shared_buffers | 128MB | 503MB |
| wal_buffers | 4MB | 16MB |
| work_mem | 4MB | 7MB |

Fig. 7: The Tuning Wizard report

You can confirm that Tuning Wizard has implemented the recommended changes by reviewing the `postgresql.conf` file for the modified server. The Tuning Wizard adds a comment above each modified parameter in the `post-`

gresql.conf file when the change is applied.



```
root@localhost:/opt/PostgresPlus/9.5AS/data
File Edit View Search Terminal Help
# The value for shared_buffers was changed by the Postgres Enterprise Manager Tuning Wizard at 2017-03-06 09:15:32
#shared_buffers = 196MB
# The value for shared_buffers was changed by the Postgres Enterprise Manager Tuning Wizard at 2017-03-06 09:18:23
shared_buffers = 196MB
# (change requires restart)
#huge_pages = try # on, off, or try # (change requires restart)
#temp_buffers = 8MB # min 800kB
#max_prepared_transactions = 0 # zero disables the feature # (change requires restart)
# Note: Increasing max_prepared transactions costs ~600 bytes of shared memory
# per transaction slot, plus lock space (see max_locks_per_transaction).
# It is not advisable to set max_prepared transactions nonzero unless you
# actively intend to use prepared transactions.
#work_mem = 4MB # min 64kB
# The value for work_mem was changed by the Postgres Enterprise Manager Tuning Wizard at 2017-03-06 09:15:32
#work_mem = 3MB
# The value for work_mem was changed by the Postgres Enterprise Manager Tuning Wizard at 2017-03-06 09:18:23
work_mem = 3MB
#maintenance_work_mem = 64MB # min 1MB
# The value for maintenance_work_mem was changed by the Postgres Enterprise Manager Tuning Wizard at 2017-03-06 09:15:32
#maintenance_work_mem = 25MB
--More-- (21%)
```

Fig. 8: Confirming a change in the postgresql.conf file

You can also confirm a parameter value by querying the server. For example, to confirm the value of the `shared_buffers` parameter, open a SQL command line using either the Query Tool (accessed through the Tools menu) or the `psql` client, and issue the command:

```
SHOW shared_buffers;
```

The value returned by the server will confirm that the parameter has been modified.

Postgres Expert - Best Practice Enforcement

The Postgres Expert utility provides expert advice on how to best configure your Postgres servers for optimal performance, security, and more. Postgres Expert serves as a PostgreSQL ‘DBA in a box’ by analyzing your servers for deviations in best practices. Postgres Expert contains three specialized Experts:

- The Configuration Expert.
- The Schema Expert.
- The Security Expert.

You can select specific rules for each Expert to analyze, or accept all rules, and then review Postgres Expert reports detailing any best practice issues that require your attention.

11.1 Using the Postgres Expert Wizard

To use the Postgres Expert wizard select the `Postgres Expert` option from the `Management` menu in the PEM client. When the wizard's `Welcome` window opens, click `Next` to continue.

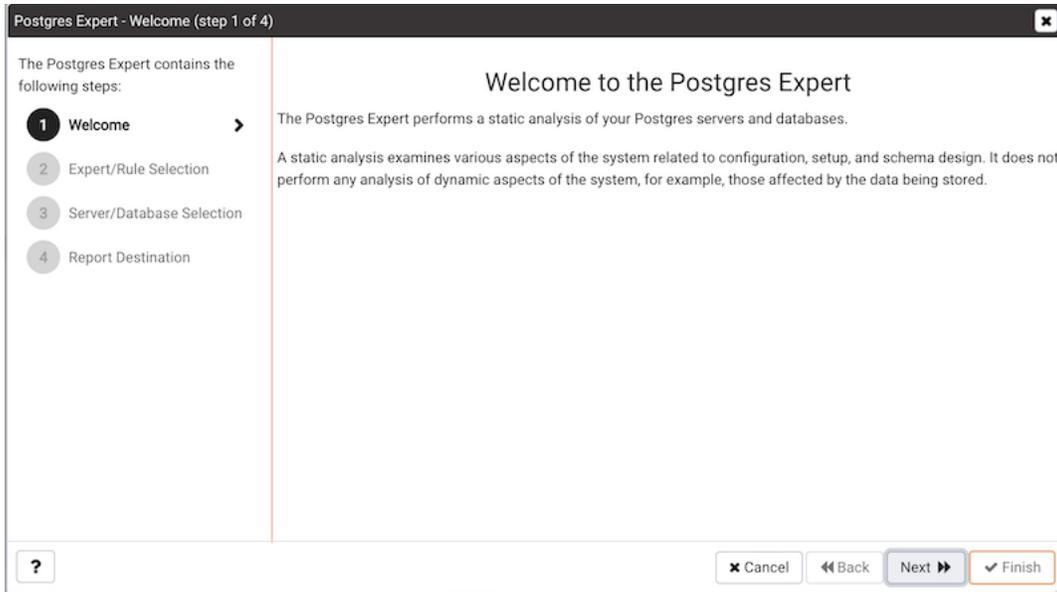


Fig. 1: *The Postgres Expert Welcome dialog*

The wizard displays a tree control that allows you to choose the Experts and Rules with which Postgres Expert will evaluate the specified server or database.

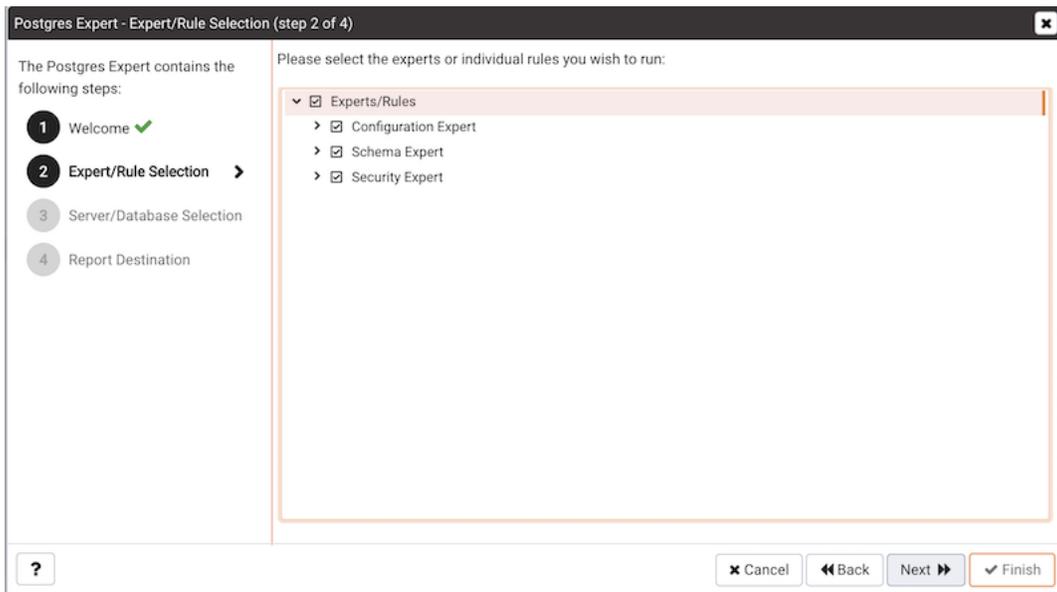


Fig. 2: *The PEM Agent Installer's Welcome dialog*

The tree control categorizes the rules under three Expert headings:

- Select from the `Configuration Expert` rules to analyze the parameter settings of the server or operating system to find any adjustments that might improve system performance.
- Select from the `Schema Expert` rules to analyze schema objects (locating missing primary keys, foreign keys without indexes, etc).
- Select from the `Security Expert` rules to review the system to find security vulnerabilities.

Use the checkmark indicator to the left of an expert or rule to indicate that the Postgres Expert should analyze the configuration of the selected servers for any best practice deviations related to the checked item.

You can:

- Check the box next to the name of an expert to select or deselect all of the configuration items listed under that node of the tree control.
- Check the box next to `Servers/Databases` to instruct Postgres Expert to review the selected server for all of the items in the tree control.
- Deselect the box next to `Servers/Databases` to un-check all of the rules; then, navigate through the tree control, specifying only the items that you wish Postgres Expert to evaluate.

After making your selections, click `Next` to continue to the `Server/Databases` tree control.

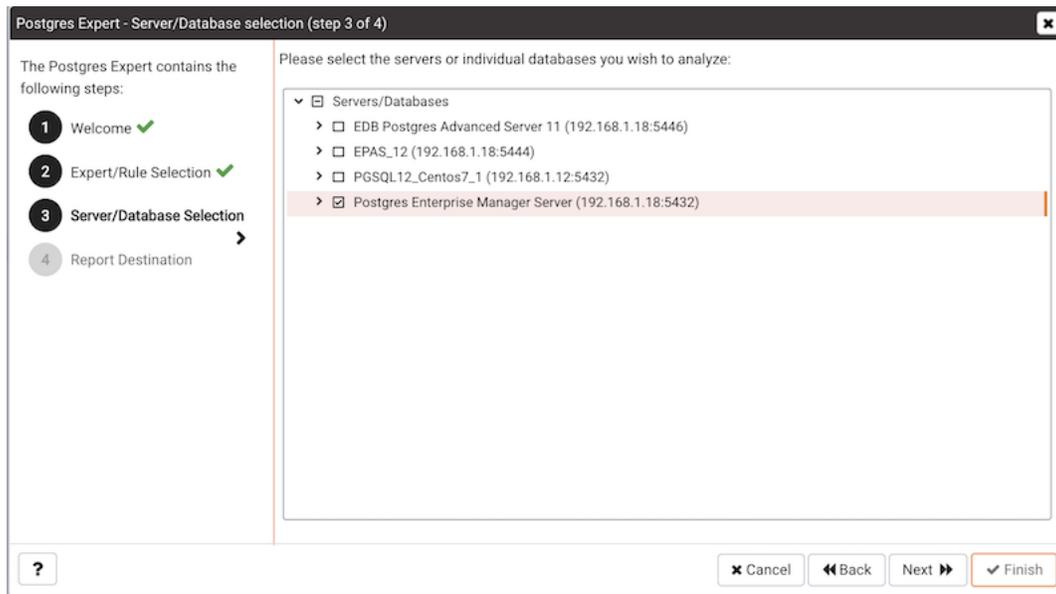


Fig. 3: *The Servers/Databases dialog*

Select or de-select the servers and databases that you would like Postgres Expert to analyze. If you select multiple servers or databases, the resulting report will contain a separate analysis of each target. When you've finished, click `Next` to select a report destination.

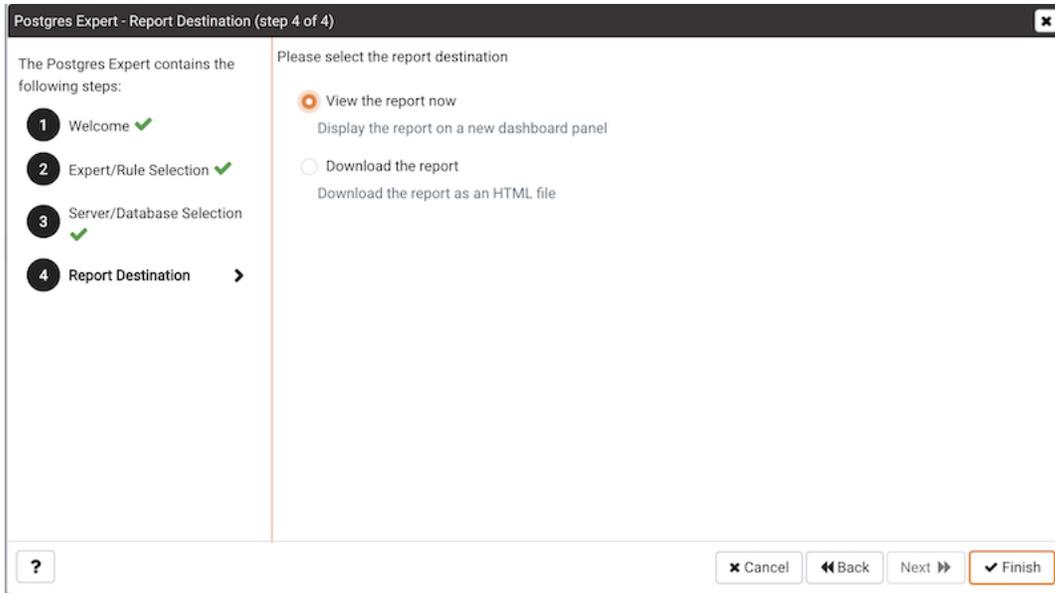
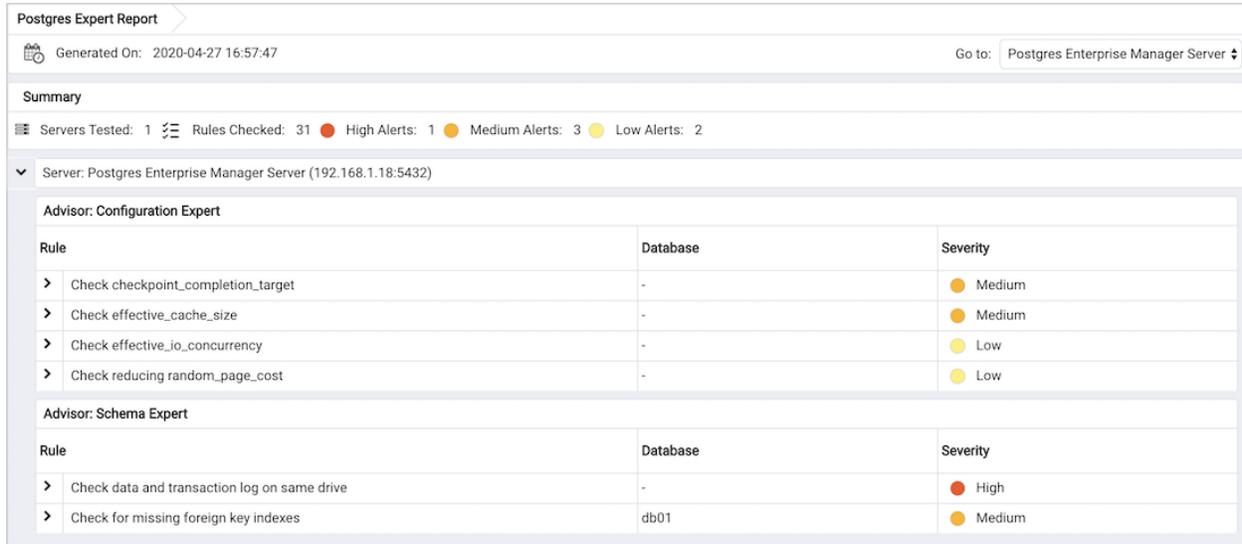


Fig. 4: *Specify a report destination*

You can select the default option and click `Finish` to view an onscreen report from Postgres Expert, or check the box next to `Download the report` to save a copy of the report to an HTML file for later use. If you choose to save the report to a file, the download will begin immediately. The file will be saved in your default download directory.

11.2 Reviewing Postgres Expert Recommendations

Postgres Expert produces an easily navigated report that contains an analysis of the selected rules, categorized by high, medium, and low severities, for the selected servers.



Postgres Expert Report

Generated On: 2020-04-27 16:57:47 Go to: Postgres Enterprise Manager Server

Summary

Servers Tested: 1 Rules Checked: 31 High Alerts: 1 Medium Alerts: 3 Low Alerts: 2

Server: Postgres Enterprise Manager Server (192.168.1.18:5432)

Advisor: Configuration Expert

| Rule | Database | Severity |
|--------------------------------------|----------|----------|
| > Check checkpoint_completion_target | - | Medium |
| > Check effective_cache_size | - | Medium |
| > Check effective_io_concurrency | - | Low |
| > Check reducing_random_page_cost | - | Low |

Advisor: Schema Expert

| Rule | Database | Severity |
|--|----------|----------|
| > Check data and transaction log on same drive | - | High |
| > Check for missing foreign key indexes | db01 | Medium |

Fig. 5: The Postgres Expert report

The report header contains a summary of the report, and includes the date and time that the report was generated, the number of rules analyzed, and the number of deviations from best practices found by Postgres Expert. Use the Jump to drop-down listbox to select a server to navigate to the section of the report that targets recommendations for that server.

The body of the report contains the detailed findings for each server selected for analysis. The findings are sorted by Expert; within each Expert heading, any rule violations are ranked by Severity.

Postgres Expert Report

Generated On: 2020-04-27 16:57:47 Go to: Postgres Enterprise Manager Server

Summary

Servers Tested: 1 Rules Checked: 31 High Alerts: 1 Medium Alerts: 3 Low Alerts: 2

Server: Postgres Enterprise Manager Server (192.168.1.18:5432)

Advisor: Configuration Expert

| Rule | Database | Severity |
|------------------------------------|----------|----------|
| Check checkpoint_completion_target | - | Medium |
| Check effective_cache_size | - | Medium |
| Check effective_io_concurrency | - | Low |
| Check reducing_random_page_cost | - | Low |

Advisor: Schema Expert

| Rule | Database | Severity |
|--|----------|----------|
| Check data and transaction log on same drive | - | High |
| Check for missing foreign key indexes | db01 | Medium |

Check checkpoint_completion_target

Recommended Value: Consider adjusting checkpoint_completion_target.

Current Values:

| Settings | Value |
|------------------------------|-------|
| checkpoint_completion_target | 0.5 |

Trigger: checkpoint_completion_target != 0.9

Description:
In order to ensure reliable and efficient crash recovery, PostgreSQL periodically writes all dirty buffers to disk. This process is called a checkpoint. Beginning in PostgreSQL 8.3, checkpoints take place over an extended period of time in order to avoid swamping the I/O system. checkpoint_completion_target controls the rate at which the checkpoint is performed, as a function of the time remaining before the next checkpoint is due to start. A value of 0 indicates that the checkpoint should be performed as quickly as possible, whereas a value of 1 indicates that the checkpoint should complete just as the next checkpoint is scheduled to start. It is usually beneficial to spread the checkpoint out as much as possible; however, if checkpoint_completion_target is set to a value greater than 0.9, unexpected delays near the end of the checkpoint process can cause the checkpoint to fail to complete before the next one needs to start. Because of this, the recommended setting is 0.9.

Fig. 6: The detailed recommendation for a rule

Click on each rule in the Postgres Expert report to display details and recommendations for that rule. Within each rule, section headings display:

- The **Advisor** section lists the name of the Postgres Expert advisor that prompted the recommendation.
- The **Trigger** section displays a description of the rule that raised the alert.
- The **Recommended Value** section displays the value to which Postgres Expert recommends setting the selected parameter.
- The **Description** section displays information and advice about the parameter that caused the alert.
- The **Current Values** section displays the current value(s) of any parameter(s) that influence the Postgres Expert's evaluation.

You can generate the System Configuration report and Core Usage report for all locally and remotely managed servers. To generate this report, select *Reports* from the *Management* Menu.

Reports has following options:

- System Configuration Report (JSON)
- System Configuration Report (HTML)
- Core Usage Report (JSON)
- Core Usage Report (HTML)

Please note that only superusers or the users with the pem_admin role permission can download the System Configuration or Core Usage reports.

Also note that information in these reports will reflect the latest probe run time.

12.1 System Configuration Report

The System Configuration Report provides detailed information about the PEM Agents group, PEM Server directory group and custom groups listed under browser tree. These groups can contain Postgres Enterprise Manager, PEM Agents and Database servers. You can download this report in HTML as well as in JSON format.

The *Postgres Enterprise Manager Summary* provides details about:

- The Postgres Enterprise Manager backend database server version
- Application version
- User name accessing the application
- Python version
- Flask version
- Platform specific information

The *Summary* provides information about the number of agents and servers.

| System Configuration Report | | Generated On: 2020-04-28 14:30:49 | | Go to: PEM Agents | |
|-------------------------------------|---|-----------------------------------|--|-------------------|--|
| Postgres Enterprise Manager Summary | | | | | |
| Parameter | Value | | | | |
| Name | Postgres Enterprise Manager | | | | |
| Backend version | PostgreSQL 12.1 on x86_64-pc-linux-gnu, compiled by gcc (GCC) 4.8.5 20150623 (Red Hat 4.8.5-39), 64-bit | | | | |
| App version | 7.14.0-dev (schema: 202003031) | | | | |
| User | postgres | | | | |
| Python version | 3.7.5 | | | | |
| Flask version | 1.0.4 | | | | |
| Platform | System : Darwin Node : Laptop358.pn.in Release : 18.7.0 Version : Darwin Kernel Version 18.7.0: Thu Jan 23 06:52:12 PST 2020; root:xnu-4903.278.25~1/RELEASE_ARM_T8020 Machine : x86_64 Processor : i386 | | | | |
| Summary | | | | | |
| Parameter | Value | | | | |
| Agents | Windows | : 0 | | | |
| | Linux | : 2 | | | |
| Servers | PG | : 2 | | | |
| | EPAS | : 2 | | | |
| | Unknown | : 0 | | | |
| | Locally Managed | : 3 | | | |
| | Remotely Managed | : 1 | | | |
| | Unmanaged | : 0 | | | |
| Group: PEM Agents | | | | | |
| Group: PEM Server Directory | | | | | |

Fig. 1: System Configuration Report - PEM Summary and Summary

The *Group: PEM Agents* panel provides details about the PEM agent, CPU cores, Disk Utilization, and Memory information.

System Configuration Report

Generated On: 2020-04-28 14:30:49 Go to: PEM Agents

> Postgres Enterprise Manager Summary

> Summary

▼ Group: PEM Agents

Agent: Postgres Enterprise Manager Host

▼ Agent Details

| Parameter | Value |
|----------------------|--|
| Platform | Linux-x64 |
| OS | CentOS Linux release 7.5.1804 (Core) |
| Version | 7.14.0-dev |
| Active | True |
| Hostname | localhost.localdomain |
| Domain Name | (none) |
| Bound Local Servers | <ul style="list-style-type: none"> ◦ Postgres Enterprise Manager Server ◦ EDB Postgres Advanced Server 11 ◦ EPAS_12 |
| Bound Remote Servers | (none) |

▼ CPU

Total CPU Cores: 2
Average CPU Utilization (%): 25.31

| Core ID | Load Percentage |
|---------|-----------------|
| CPU0 | 25.267327 |
| CPU1 | 25.353135 |

▼ Disk Utilization

Total Disk Size (MB): 32098
Disk Space Used (MB): 13791
Disk Space Available (MB): 16669
Disk Utilization (%): 42.97

| Mount Point | File System | Size (MB) | Space Used (MB) | Space Available (MB) |
|-------------|-------------|-----------|-----------------|----------------------|
| / | /dev/sda3 | 31622 | 13657 | 16352 |
| /boot | /dev/sda1 | 476 | 134 | 317 |

▼ Memory Details

| Parameter | Value |
|-------------------------|-------|
| Free RAM (MB) | 1050 |
| Memory Usage Percentage | 72.17 |
| Total Swap Memory (MB) | 7999 |
| Free Swap Memory (MB) | 6589 |
| Swap Usage Percentage | 17.63 |

Agent: localhost.localdomain

> Agent Details

> CPU

> Disk Utilization

> Memory Details

> Group: PEM Server Directory

Fig. 2: System Configuration Report - PEM Agents

The *Group: PEM Server Directory*, provides details about:

- Database server version
- Host
- Port
- Database name
- Database size
- Tablespace size

System Configuration Report
Generated On: 2020-04-28 14:30:49
Go to: PEM Agents

Postgres Enterprise Manager Summary

Summary

Group: PEM Agents

Group: PEM Server Directory

Server: Postgres Enterprise Manager Server

Server Details

| Parameter | Value |
|-------------------|---|
| Agent | Postgres Enterprise Manager Host |
| Host | 192.168.1.19 |
| Port | 5432 |
| Database | postgres |
| Version | PostgreSQL 12.1 on x86_64-pc-linux-gnu, compiled by gcc (GCC) 4.8.5 20150623 (Red Hat 4.8.5-39), 64-bit |
| Service Id | postgresql-12 |
| Remote Monitored? | False |
| Active | True |

Database Details

| Name | Size (MB) | Tablespace Name |
|---------------|-----------|-----------------|
| postgres | 8 | pg_default |
| edbstore_temp | 8 | pg_default |
| hr | 8 | pg_default |
| pem | 2407 | pg_default |
| testdb | 27 | pg_default |
| db01 | 8 | pg_default |

Tablespace Details

| Name | Size (MB) |
|------------|-----------|
| pg_global | 0 |
| pg_default | 2482 |

Server: EPAS_12

Server Details

Database Details

Tablespace Details

Server: EDB Postgres Advanced Server 11

Server Details

Database Details

Tablespace Details

Server: PGSQL12_Centos7_1

Server Details

Database Details

Tablespace Details

Fig. 3: System Configuration Report - Group Server Name

Please note that here `Group Server Name` depends on the group name to which the server is added.

12.2 Core Usage Report

The Core Usage report provides detailed information about number of cores specific to:

- The server type
- Database version
- Platform and group name

The report also gives detailed information about locally managed servers:

- Type
- Host
- Port
- Platform
- Cores
- RAM

| Core Usage Report | | | | | |
|--|------------------------------|------------------|-------------|----------|----------------|
| Generated On: 2020-02-18 16:08:47 IST Using: Postgres Enterprise Manager Version: 7.13.0-dev (schema: 202001011) | | | | | |
| Core Summary | | | | | |
| Total Number of Cores: 13 | | | | | |
| Server Type | Number of Servers | Number of Cores | | | |
| EDB Postgres Advanced Server | 1 | 4 | | | |
| PostgreSQL | 2 | 5 | | | |
| BART | 1 | 4 | | | |
| Database Version | Number of Servers | Number of Cores | | | |
| PostgreSQL 10 | 1 | 4 | | | |
| PostgreSQL 11 | 1 | 1 | | | |
| Advanced Server 11 | 1 | 4 | | | |
| Platform | Number of Servers | Number of Cores | | | |
| Windows-x64 | 1 | 1 | | | |
| Linux-x64 | 3 | 12 | | | |
| Group Name | Number of Servers | Number of Cores | | | |
| PEM Server Directory | 3 | 9 | | | |
| Server Core Summary | | | | | |
| Locally Managed Servers: 3 | | | | | |
| Name | Type | Host:Port | Platform | Cores | Total RAM (MB) |
| Windows PostgreSQL 11 | PostgreSQL | 127.0.0.1:5432 | Windows-x64 | 1 | 2047 |
| PostgreSQL-10-Local | PostgreSQL | localhost:5432 | Linux-x64 | 4 | 5786 |
| Postgres Enterprise Manager Server | EDB Postgres Advanced Server | 127.0.0.1:5444 | Linux-x64 | 4 | 5786 |
| | | | | 9 | 13619 |
| Remotely Managed Servers: 1 | | | | | |
| Name | Type | Host:Port | | | |
| PostgreSQL-11-Remote | PostgreSQL | 172.19.12.3:5432 | | | |
| Unmanaged Servers: 1 | | | | | |
| Name | Host:Port | | | | |
| Performance Diagnostics Server | 172.16.254.22: 5444 | | | | |

Fig. 4: Core Usage Report

Monitoring Failover Manager

If you are using EDB Failover Manager to monitor your replication scenario, you must manually install and configure Failover Manager. For detailed information about installing Failover Manager, visit the EnterpriseDB website at:

<https://www.enterprisedb.com/products/edb-postgres-platform/edb-postgres-failover-manager>

To monitor the status of a Failover Manager cluster on the Streaming Replication dashboard, you must provide the following information on the `Advanced` tab of the `server Properties` dialog for each node of the cluster:

- Use the `EFM Cluster Name` field to specify the name of the Failover Manager cluster. The cluster name is the prefix of the name of the cluster properties file. For example, if your cluster properties file is named `efm.properties`, your cluster name is `efm`.
- Use the `EFM Installation Path` field to specify the location of the Failover Manager binary file. By default, the Failover Manager binary file is installed in `/usr/efm-2.1/bin`.

After registering your servers, the `Streaming Replication Analysis` dashboard will display status information about your EFM cluster near the bottom of the dashboard.

| Properties | | Values |
|---------------------------------------|----------------------------------|--------|
| Cluster Name | efm | |
| Failover Manager Agent Running Status | UP | |
| Allowed Node List | 192.168.172.143, 192.168.172.147 | |
| Standby Priority List | | |
| Cluster Status Message | No standby databases were found. | |

| Agent Type | Address | Agent | DB | XLog Location | Status Information | XLog Information | VIP | VIP Status |
|------------|-----------------|-------|---------|---------------|--------------------|---|-----------------|------------|
| Master | 192.168.172.143 | UP | UP | 0/3FBD508 | | | 192.168.172.149 | True |
| Idle | 192.168.172.147 | UP | UNKNOWN | UNKNOWN | | Connection to 192.168.172.147:5550 refused. Check that the hostname and port are correct and that the postmaster is accepting TCP/IP connections. | 192.168.172.149 | False |

Fig. 1: *The Failover Manager cluster status report*

The Failover Manager Cluster Status section of the Streaming Replication Analysis dashboard displays information about the monitored cluster:

The Failover Manager Cluster Information table provides information about the Failover Manager cluster:

- The Properties column displays the name of the cluster property.
- The Values column displays the current value of the property.

The Failover Manager Node Status table displays information about each node of the Failover Manager cluster:

- The Agent Type column displays the type of agent that resides on the node; the possible values are Master, Standby, Witness, Idle, and Promoting.
- The Address column displays the IP address of the node.
- The Agent column displays the status of the agent that resides on the node.
- The DB column displays the status of the database that resides on the node.
- The XLog Location column displays the transaction log location of the database.
- The Status Information column displays any error-related information about the node.
- The XLog Information column displays any error-related information about the transaction log.
- The VIP column displays the VIP address that is associated with the node.
- The VIP Status column displays True if the VIP is active for the node, False if the VIP is not.

13.1 Replacing a Master Node

You can use the PEM client to replace the Master node of a Failover Manager cluster with a standby node. To initiate the failover process, select **Replace Cluster Master** from the Management menu. A dialog opens, asking you to confirm that you wish to replace the current master node.

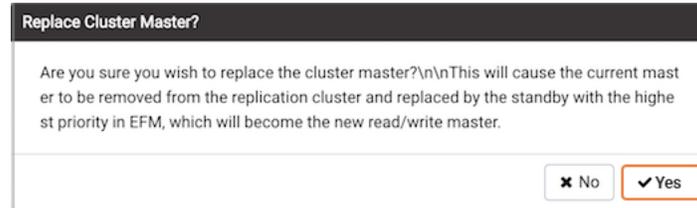


Fig. 2: Replacing the Master node of a cluster

Select **Yes** to remove the current master node from the Failover Manager cluster and promote a standby node to the role of read/write master node within a Failover Manager cluster. The node with the highest promotion priority (defined in Failover Manager) will become the new master node. PEM will display a dialog, reporting the job status.

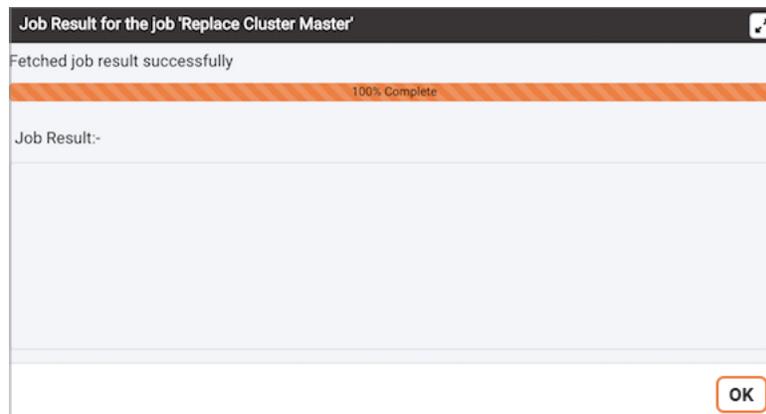


Fig. 3: Confirmation of the promotion

When the job completes and the Streaming Replication Analysis dashboard refreshes, you can review the **Failover Manager Node Status** table to confirm that a standby node has been promoted to the role of master within the Failover Manager cluster.

Monitoring an xDB Replication Cluster

Before configuring PEM to retrieve statistics from an Advanced Server or PostgreSQL database that is part of an xDB replication scenario, you must manually install and configure xDB Replication. For more information about xDB replication solutions and documentation, please visit the EnterpriseDB website at:

<http://www.enterprisedb.com/products-services-training/products-overview/xdB-replication-server-multi-master>

The PEM xDB Replication probe monitors lag data for clusters that use xDB multi-master or single-master replication that have a publication database that is an EDB Postgres Advanced Server or PostgreSQL database. Please note that if you have configured replication between other proprietary database hosts (i.e. Oracle or SQL Server) and Advanced Server or PostgreSQL, the probe cannot return lag information.

Properties SQL Statistics Dependencies Dependents Monitoring Manage Probes ✕

Description

Manage Custom Probes: PEM uses probes to retrieve statistics from a monitored server, database, operating system or agent. You can view, reconfigure, delete, or create your own custom probes.

Copy Probes: PEM allows copying of probes from any chosen object recursively down through the object hierarchy. Click on Copy Probes to quickly copy the displayed probe configuration to a selected target.

Quick Links

 Manage Custom Probes
  Copy Probes
  Help

Probes

| Probe name | Execution Frequency | | | Enabled? | | Data Retention | | Days |
|--|-------------------------------------|---------|---------|-------------------------------------|-------------------------------------|-------------------------------------|-----|------|
| | Default? | Minutes | Seconds | Default? | Probe Enable? | Default? | | |
| Background Writer Statistics | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Blocked Session Information | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Data and Log File Analysis | <input checked="" type="checkbox"/> | 0 | 10 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Database Frozen XID | <input checked="" type="checkbox"/> | 720 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Database Size | <input checked="" type="checkbox"/> | 30 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Database Statistics | <input checked="" type="checkbox"/> | 30 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 90 | |
| Failover Manager Cluster Info | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 7 | |
| Failover Manager Node Status | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 7 | |
| Lock Information | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Number of Prepared Transactions | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Number of WAL Files | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Object Catalog: Database | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Object Catalog: Tablespace | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| PG HBA Conf | <input checked="" type="checkbox"/> | 30 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Server Information | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Server log Configuration | <input checked="" type="checkbox"/> | 0 | 10 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Session Information | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Settings | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Streaming Replication | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Streaming Replication Database Conflicts | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Streaming Replication Lag Time | <input checked="" type="checkbox"/> | 5 | 0 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| Tablespace Size | <input checked="" type="checkbox"/> | 30 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| User Information | <input checked="" type="checkbox"/> | 30 | 0 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |
| WAL Archive Status | <input checked="" type="checkbox"/> | 30 | 0 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 180 | |

Fig. 1: The Manage Probes tab

By default, the xDB Replication probe is disabled. To enable the xDB Replication probe, right click on the name of the server, and select *Connect* from the context menu; if prompted, provide authentication information. After connecting, expand the server node of the tree control, and highlight the name of the replicated database. Then, select *Manage Probes . . .* from the Management menu.

Use fields on the *Manage Probes* tab to configure the xDB Replication probe:

- Move the *Default* slider to *No* to modify the *Minutes* and *Seconds* between probe executions.
- Use the *Enabled?* slider to instruct PEM to execute the xDB Replication probe.
- Set the *Default* slider in the *Data Retention* field to *No* to modify the number of days that PEM will store the information retrieved by the probe.

After enabling the probe, you can use the metrics returned to create custom charts and dashboards in the PEM client.

Performance Diagnostics

You can use the Performance Diagnostic dashboard to analyze the database performance for Advanced Server instances by monitoring the wait events. To display the diagnostic charts, PEM uses the data collected by Advanced Server's EDB Wait States module.

For more information about EDB Wait States, see the *EDB Postgres Advanced Server Guide*, available at:

https://www.enterprisedb.com/edb-docs/d/edb-postgres-advanced-server/user-guides/user-guide/latest/EDB_Postgres_Advanced_Server_Guide.1.78.html#

You can analyze the Wait States data on multiple levels by narrowing down your selection of data. Each level of the chart is populated on the basis of your selection of data at the higher level.

Prerequisites

- You must have superuser privileges to access the Performance Diagnostic dashboard.
- You must ensure that the EDB Wait States module is installed. Modify the `postgresql.conf` file, adding the `edb_wait_states` library to the list of libraries in the `shared_preload_libraries` parameter:

```
shared_preload_libraries = '$libdir/edb_wait_states'
```

Then, restart the database server, and create the extension:

```
CREATE EXTENSION edb_wait_states;
```

The console will display an error if you do not meet the prerequisites.

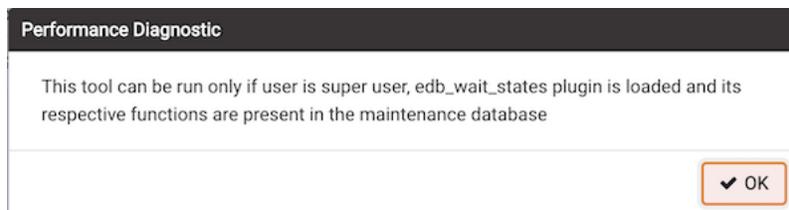


Fig. 1: *The prerequisites error*

To open the Performance Diagnostic dashboard, select the Performance Diagnostic option from the Management menu of the PEM client.

By default, the top most Performance Diagnostic chart pulls the data for one hour, starting from current date and time. The default range selection in hours in the first chart can be customized in the Performance Diagnostic section of the Preferences dialog under the File menu. You can also use the Preferences dialog to display Performance Diagnostic in a new browser tab. Use Open in New Browser Tab? to display the Performance Diagnostics dashboard in a new browser tab.



Fig. 2: The Performance Diagnostics chart

Use the Last drop-down list box to select the duration for which you want to see the chart. Select the 1 hour, 4 hours, 12 hours, or 24 hours. You can also select the date and time through which you want the data to be displayed.

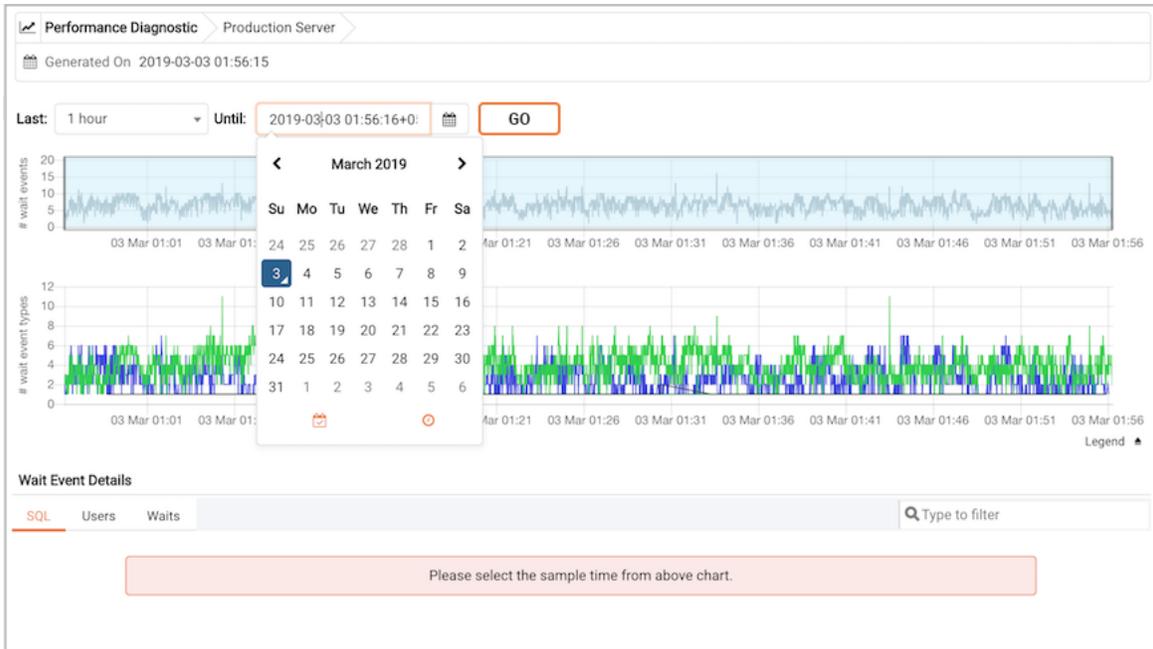


Fig. 3: *Selecting a date*

The first chart displays the number of wait events that have occurred over the period of time that is selected for the charts. You can narrow down the timeline in the first chart to analyze the data for a specific period. The second chart displays the total number of wait events of each type, for the timeline that you select in the first chart. You can select the specific wait event types for which you want to analyze the data.

To make differentiation easier, the graph for each wait event type is displayed in a different color. Click on Legend to identify the color in which a particular wait event type is displayed in the graph.

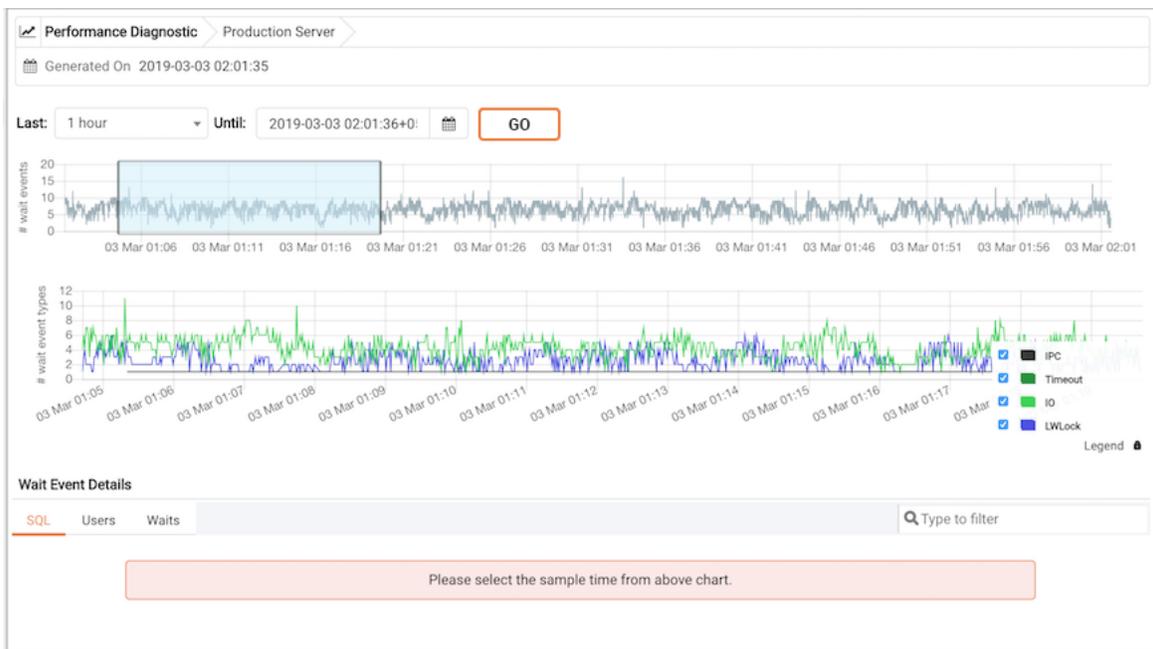


Fig. 4: *Selecting a timeline*

Select a point in time on the second chart for which you wish to analyze the wait events; the `Wait Event Details` panel is populated on the basis of your selection in the second chart. The panel makes wait details available on three tabs:

- The `SQL` tab displays the list of SQL queries having wait events for the selected sample time.
- The `Users` tab displays the details of the wait events grouped by users for selected sample time.
- The `Waits` tab displays the number of wait events belonging to each wait event type for the selected sample time.

You can filter the data displayed on the three tabs, or sort the data alphabetically by clicking on a column header.

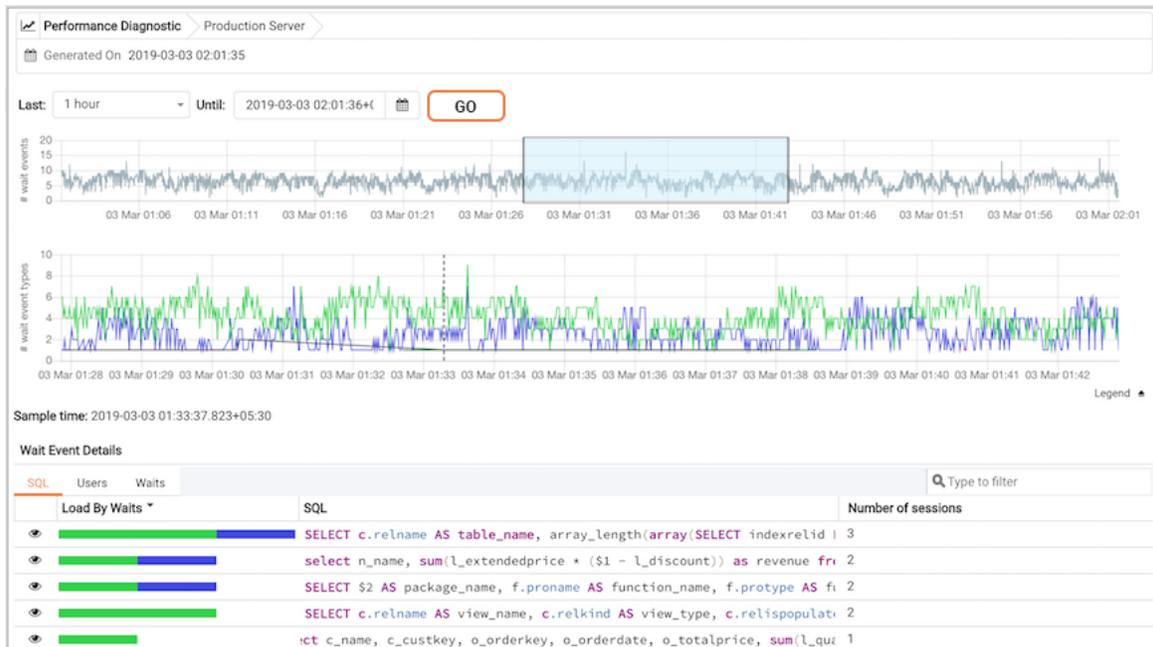


Fig. 5: Reviewing query details

Click on the Eye icon in any row to display a new tab with details of the query for a particular row. This tab displays the `Query ID` and its corresponding sessions IDs in a dropdown list. Select the session ID for the query for which you want to analyze the data; the tab will display details corresponding to the selected session ID and query ID.

The `Waits` information table displays the waiting query. If the query is partially displayed, click the down arrow at the bottom of the section to view the complete SQL query.

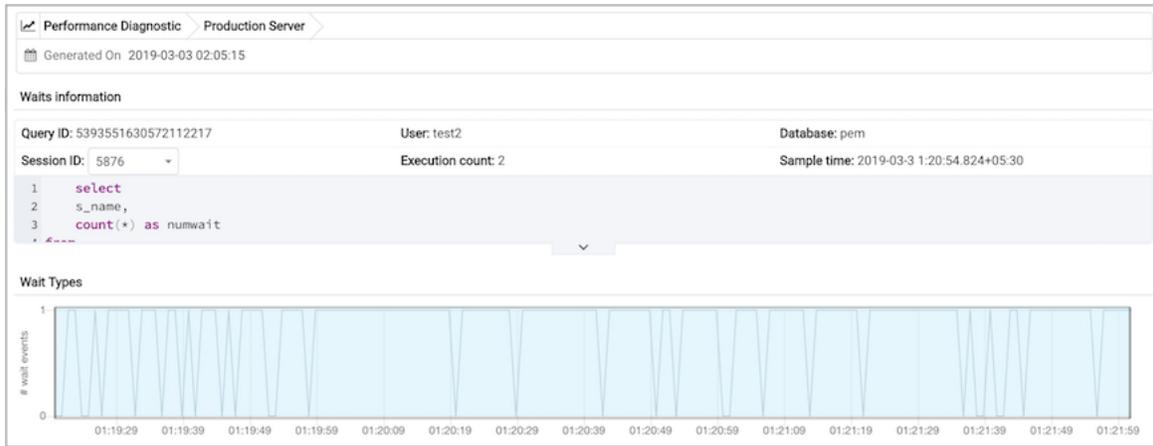


Fig. 6: The Waits information panel

The Wait Types panel displays the total number of wait events for the selected session ID and query ID. Select a time range in the first chart to analyze the data for a specific period.

The Wait Types bar graph displays the total number of wait event types for the duration that you select. To make differentiation easier, each wait event type is represented by a different color in the bar graph.

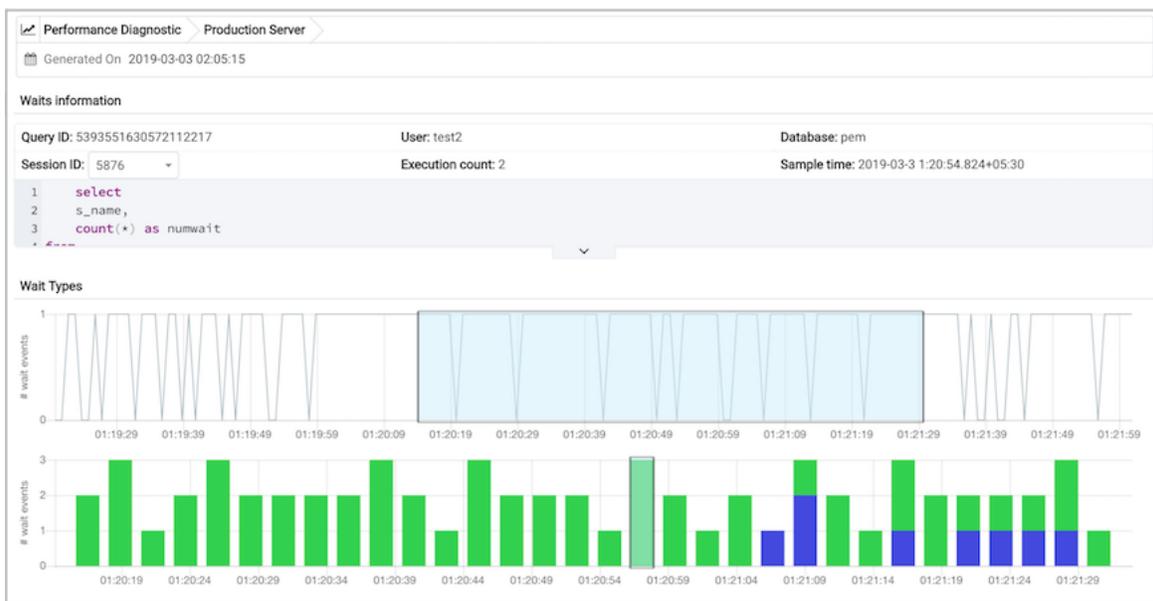


Fig. 7: The wait types bar graph

Select the range for which you want to analyze the wait event types and their corresponding wait events; the Wait Events donut chart is populated on the basis of your selection. In the Wait Events donut chart, all the wait event types applicable to the selected duration are displayed in the percentage format. You can select any one wait event type to see all the wait events belonging to that particular wait event type and their count. Click Read More to read about the various wait event types and wait events.

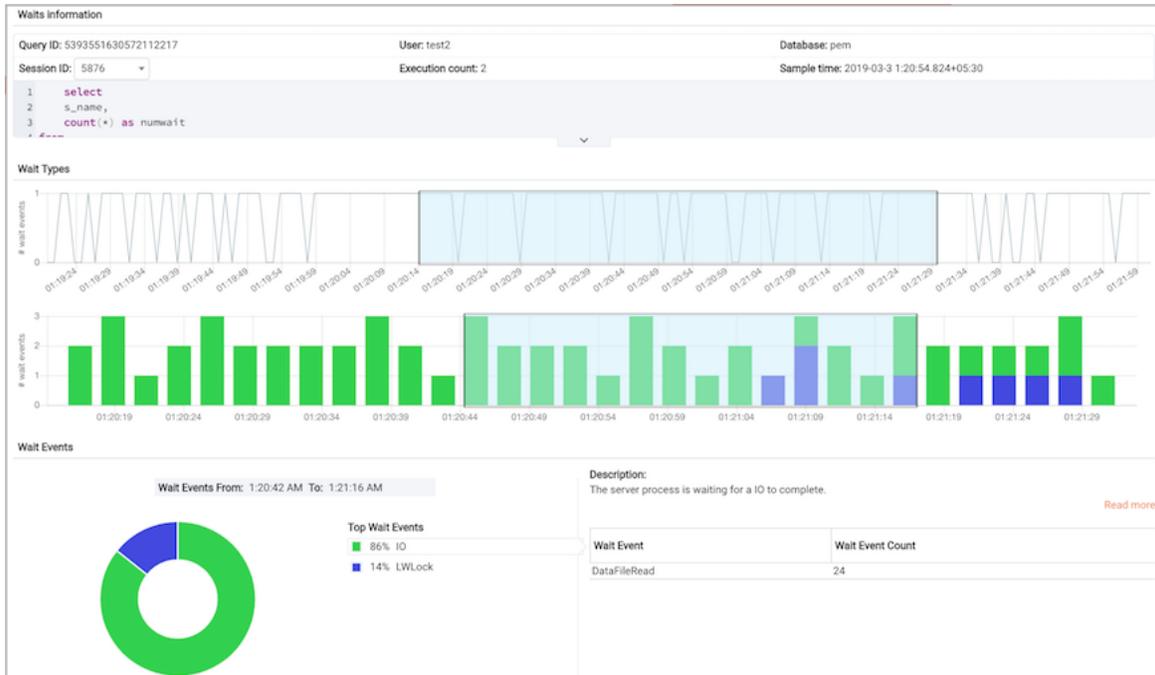


Fig. 8: The wait events donut chart

In the Wait Events donut chart, all the wait event types applicable to the selected timeline are displayed a percentage format. You can select any one wait event type to see all the wait events belonging to that particular wait event type and their count. Click the Read More link to read about the various wait event types and wait events.

The following sections are provided for reference; please note that the items referred to in the following tables are subject to change.

16.1 PEM Server Configuration Parameters - Reference

You can use global configuration options to modify aspects of the PEM Server's behavior. Please note that the list of configuration parameters is subject to change.

| Parameter name | Value and Unit | Description |
|---------------------------|----------------|--|
| audit_log_retention_time | 30 days | Specifies the number of days that an audit log will be retained on the PEM server. |
| auto_create_agent_alerts | true | Specifies whether to create default agent level alerts automatically when an agent is registered. |
| auto_create_server_alerts | true | Specifies whether to create default server level alerts automatically when a server is bound to an agent. |
| chart_disable_bullets | false | Enable/disable bullets on line charts on dashboards and Capacity Manager reports. |
| cm_data_points_per_report | 50 | Specifies the number of data points to plot on charts on Capacity Manager reports. |
| cm_max_end_date_in_years | 5 years | Specifies the maximum amount of time that the Capacity Manager will extrapolate data for. Ensures that threshold-based end dates of on reports do not get extrapolated indefinitely. |
| dash_alerts_timeout | 60 seconds | Specifies the number of seconds after which the components of the Alerts dashboard are auto-refreshed. |

continues on next page

Table 1 – continued from previous page

| Parameter name | Value and Unit | Description |
|----------------------------|----------------|--|
| dash_db_comrol_span | 7 days | Specifies the number of days worth of data to plot on the Commit/Rollback Analysis chart on the Database Analysis dashboard and Server Analysis dashboard. |
| dash_db_comrol_timeout | 1800 seconds | Specifies the number of seconds after which the Commits/Rollbacks line chart is auto-refreshed on the Database Analysis dashboard and Server Analysis dashboard. |
| dash_db_connovervw_timeout | 300 seconds | Specifies the number of seconds after which the Connection Overview pie chart is auto-refreshed in the Database Analysis dashboard. |
| dash_db_eventlag_span | 7 days | Specifies the number of days worth of data to plot on the Number of Events Lag chart for slony replication on the Database Analysis dashboard. |
| dash_db_eventlag_timeout | 1800 seconds | Specifies the number of seconds after which the Number of Events Lag line chart for slony replication is auto-refreshed on the Database Analysis dashboard. |
| dash_db_hottable_rows | 25 rows | Specifies the number of rows to show on the HOT Table Analysis table on the Database Analysis dashboard. |
| dash_db_hottable_timeout | 300 seconds | Specifies the number of seconds after which the Hot Tables table is auto-refreshed in the Database Analysis dashboard. |
| dash_db_io_span | 7 days | Specifies the number of days worth of data to plot on the Database I/O Analysis chart on the Database Analysis dashboard and I/O Analysis dashboard. |
| dash_db_io_timeout | 1800 seconds | Specifies the number of seconds after which the Database I/O line chart is auto-refreshed on the Database Analysis dashboard and I/O Analysis dashboard. |
| dash_db_rowact_span | 7 days | Specifies the number of days worth of data to plot on the Row Activity Analysis chart on the Database Analysis dashboard, the I/O Analysis dashboard, and the Server Analysis dashboard. |
| dash_db_rowact_timeout | 1800 seconds | Specifies the number of seconds after which the Row Activity line chart is auto-refreshed on the Database Analysis dashboard, the I/O Analysis dashboard, and the Server Analysis dashboard. |
| dash_db_storage_timeout | 300 seconds | Specifies the number of seconds after which the Storage bar chart is auto-refreshed in the Database Analysis dashboard. |

continues on next page

Table 1 – continued from previous page

| Parameter name | Value and Unit | Description |
|--------------------------------|----------------|---|
| dash_db_timelag_span | 7 days | Specifies the number of days worth of data to plot on the Time Lag chart for Slony replication on the Database Analysis dashboard. |
| dash_db_timelag_timeout | 1800 seconds | Specifies the number of seconds after which the Time Lag line chart for Slony replication is auto-refreshed on the Database Analysis dashboard. |
| dash_db_useract_span | 7 days | Specifies the number of days worth of data to plot on the User Activity Analysis chart on the Database Analysis dashboard. |
| dash_db_useract_timeout | 1800 seconds | Specifies the number of seconds after which the User Activity line chart is auto-refreshed in the Database Analysis dashboard. |
| dash_efm_timeout | 300 seconds | Specifies the number of seconds after which the Failover Manager Node Status and Failover Manager Cluster Info line chart is auto-refreshed on the Streaming Replication dashboard. |
| dash_global_overview_timeout | 30 seconds | Specifies the number of seconds after which the components of the Global Overview dashboard are auto-refreshed. |
| dash_header_timeout | 60 seconds | Specifies the number of seconds after which the information on the header of all the dashboards are auto-refreshed. |
| dash_io_chkpt_span | 7 days | Specifies the number of days worth of data to plot on the Checkpoints chart on the I/O Analysis dashboard. |
| dash_io_chkpt_timeout | 1800 seconds | Specifies the number of seconds after which the Checkpoints line chart is auto-refreshed on the I/O Analysis dashboard. |
| dash_io_hotindx_timeout | 300 seconds | Specifies the number of seconds after which the Hot Indexes bar chart is auto-refreshed on the I/O Analysis dashboard. |
| dash_io_hottbl_timeout | 300 seconds | Specifies the number of seconds after which the Hot Tables bar chart is auto-refreshed on the I/O Analysis dashboard. |
| dash_io_index_objectio_rows | 25 rows | Specifies the number of rows displayed on the Index Activity table on the I/O Analysis dashboard and the Object Activity Analysis dashboard. |
| dash_io_index_objectio_timeout | 60 seconds | Specifies the number of seconds after which the Index Activity table is auto-refreshed on the I/O Analysis dashboard and the Object Activity Analysis dashboard. |
| dash_io_objectio_rows | 25 rows | Specifies the number of rows displayed in the Object I/O Details table on the I/O Analysis dashboard and Object Activity Analysis dashboard. |

continues on next page

Table 1 – continued from previous page

| Parameter name | Value and Unit | Description |
|--------------------------------------|----------------|---|
| dash_io_objectio_timeout | 300 seconds | Specifies the number of seconds after which the Object I/O Details table is auto-refreshed on the I/O Analysis dashboard and Object Activity Analysis dashboard. |
| dash_memory_hostmemact_span | 7 days | Specifies the number of days worth of data to plot on the Host Memory Activity Analysis chart on the Memory Analysis dashboard. |
| dash_memory_hostmemact_timeout | 1800 seconds | Specifies the number of seconds after which the Host Memory Activity line chart is auto-refreshed on the Memory Analysis dashboard. |
| dash_memory_hostmemconf_timeout | 300 seconds | Specifies the number of seconds after which the Host Memory Configuration pie chart is auto-refreshed on the Memory Analysis dashboard and Server Analysis dashboard. |
| dash_memory_servmemact_span | 7 days | Specifies the number of days worth of data to plot on the server Memory Activity Analysis chart on the Memory Analysis dashboard. |
| dash_memory_servmemact_timeout | 1800 seconds | Specifies the number of seconds after which the Server Memory Activity line chart is auto-refreshed on the Memory Analysis dashboard. |
| dash_memory_servmemconf_timeout | 300 seconds | Specifies the number of seconds after which the Server Memory Configuration pie chart is auto-refreshed on the Memory Analysis dashboard. |
| dash_objectact_objstorage_rows | 15 rows | Specifies the number of rows to show on the Object Storage table on the Object Activity Analysis dashboard. |
| dash_objectact_objstorage_timeout | 300 seconds | Specifies the number of seconds after which the Object Storage table is auto-refreshed in the Object Activity Analysis dashboard. |
| dash_objectact_objtopindexes_timeout | 300 seconds | Specifies the number of seconds after which the Top 5 Largest Indexes bar chart is auto-refreshed in the Object Activity Analysis dashboard. |
| dash_objectact_objjoptables_timeout | 300 seconds | Specifies the number of seconds after which the Top 5 Largest Tables bar chart is auto-refreshed in the Object Activity Analysis dashboard. |
| dash_os_cpu_span | 7 days | Specifies the number of days worth of data to plot on the CPU chart on the Operating System Analysis dashboard. |
| dash_os_cpu_timeout | 1800 seconds | Specifies the number of seconds after which the CPU line chart is auto-refreshed on the Operating System Analysis dashboard. |

continues on next page

Table 1 – continued from previous page

| Parameter name | Value and Unit | Description |
|-----------------------------------|----------------|--|
| dash_os_data_span | 7 days | Specifies the number of days worth of data to plot on the I/O line chart on the Operating System Analysis dashboard. |
| dash_os_disk_span | 7 days | Specifies the number of days worth of data to plot on the Utilisation chart on the Operating System Analysis dashboard. |
| dash_os_hostfs_timeout | 1800 seconds | Specifies the number of seconds after which the Host File System Details table is auto-refreshed on the Operating System Analysis dashboard. |
| dash_os_io_timeout | 1800 seconds | Specifies the number of seconds after which the I/O line chart is auto-refreshed on the Operating System Analysis dashboard. |
| dash_os_memory_span | 7 days | Specifies the number of days worth of data to plot on the Memory chart on the Operating System Analysis dashboard. |
| dash_os_memory_timeout | 1800 seconds | Specifies the number of seconds after which the Memory line chart is auto-refreshed on the Operating System Analysis dashboard. |
| dash_os_packet_span | 7 days | Specifies the number of days worth of data to plot on the Packet chart on the Operating System Analysis dashboard. |
| dash_os_packet_timeout | 1800 seconds | Specifies the number of seconds after which the Network Packets line chart is auto-refreshed on the Operating System Analysis dashboard. |
| dash_os_process_span | 7 days | Specifies the number of days worth of data to plot on the Process chart on the Operating System Analysis dashboard. |
| dash_os_process_timeout | 1800 seconds | Specifies the number of seconds after which the Process line chart is auto-refreshed on the Operating System Analysis dashboard. |
| dash_os_storage_timeout | 1800 seconds | Specifies the number of seconds after which the Storage pie chart is auto-refreshed on the Operating System Analysis dashboard. |
| dash_os_traffic_span | 7 days | Specifies the number of days worth of data to plot on the Traffic chart on the Operating System Analysis dashboard. |
| dash_os_traffic_timeout | 1800 seconds | Specifies the number of seconds after which the Traffic line chart is auto-refreshed on the Operating System Analysis dashboard. |
| dash_os_util_timeout | 1800 seconds | Specifies the number of seconds after which the Utilisation line chart is auto-refreshed on the Operating System Analysis dashboard. |
| dash_probe_log_timeout | 300 seconds | Specifies the number of seconds after which the Probe Log table is auto-refreshed on |
| dash_replication_archivestat_span | 7 days | Specifies the number of days worth of data to plot on the WAL Archive Status chart on the Streaming Replication Analysis dashboard. |

continues on next page

Table 1 – continued from previous page

| Parameter name | Value and Unit | Description |
|--------------------------------------|----------------|---|
| dash_replication_archivestat_timeout | 1800 seconds | Specifies the number of seconds after which the WAL Archive Status line chart is auto-refreshed on the Streaming Replication dashboard. |
| dash_replication_pagelag_span | 7 days | Specifies the number of days worth of data to plot on the WAL Lag Pages chart on the Streaming Replication dashboard. |
| dash_replication_pagelag_timeout | 1800 seconds | Specifies the number of seconds after which the WAL Lag Pages line chart is auto-refreshed on the Streaming Replication dashboard. |
| dash_replication_segmentlag_span | 7 days | Specifies the number of days worth of data to plot on the WAL Lag Segments chart on the Streaming Replication dashboard. |
| dash_replication_segmentlag_timeout | 1800 seconds | Specifies the number of seconds after which the WAL Lag Segments line chart is auto-refreshed on the Streaming Replication dashboard. |
| dash_replication_timelag_span | 7 days | Specifies the number of days worth of data to plot on the Replication Lag Time chart on the Streaming Replication dashboard. |
| dash_replication_timelag_timeout | 1800 seconds | Specifies the number of seconds after which the Replication Lag Time line chart is auto-refreshed on the Streaming Replication dashboard. |
| dash_server_buffers_written | 168 hours | Specifies the number of days worth of data to plot on the Background Writer Statistics chart on the Server Analysis dashboard. |
| dash_server_buffers_written_timeout | 300 seconds | Specifies the number of seconds after which the Background Writer Statistics line chart is auto-refreshed on the Server Analysis dashboard. |
| dash_server_connovervw_timeout | 300 seconds | Specifies the number of seconds after which the Connection Overview pie chart is auto-refreshed in the Server Analysis dashboard. |
| dash_server_database_timeout | 300 seconds | Specifies the number of seconds after which the Databases table is auto-refreshed in the Server Analysis dashboard. |
| dash_server_dbsize_span | 7 days | Specifies the number of days worth of data to plot on the Database Size Analysis on the Server Analysis dashboard. |
| dash_server_dbsize_timeout | 1800 seconds | Specifies the number of seconds after which the Database Size line chart is auto-refreshed in the Server Analysis dashboard. |
| dash_server_disk_timeout | 1800 seconds | Specifies the number of seconds after which the Disk line chart is auto-refreshed in the Server Analysis dashboard. |
| dash_server_global_span | 7 days | Specifies the number of days worth of data to plot on the Disk line chart on the Server Analysis dashboard. |

continues on next page

Table 1 – continued from previous page

| Parameter name | Value and Unit | Description |
|----------------------------------|----------------|---|
| dash_server_sharedbuff_span | 7 days | Specifies the number of days worth of data to plot on the Shared Buffer chart on the Server Analysis dashboard. |
| dash_server_sharedbuff_timeout | 1800 seconds | Specifies the number of seconds after which the Shared Buffers line chart is auto-refreshed in the Server Analysis dashboard. |
| dash_server_tabspacesize_span | 7 days | Specifies the number of days worth of data to plot on the Tablespace Size chart on the Server Analysis dashboard. |
| dash_server_tabspacesize_timeout | 1800 seconds | Specifies the number of seconds after which the Tablespace Size line chart is auto-refreshed in the Server Analysis dashboard. |
| dash_server_useract_span | 7 days | Specifies the number of days worth of data to plot on the User Activity chart on the Server Analysis dashboard. |
| dash_server_useract_timeout | 1800 seconds | Specifies the number of seconds after which the User Activity line chart is auto-refreshed in the Server Analysis dashboard. |
| dash_sessact_lockact_timeout | 300 seconds | Specifies the number of seconds after which the Session Lock Activity table is auto-refreshed in the Session Activity Analysis dashboard. |
| dash_sessact_workload_timeout | 300 seconds | Specifies the number of seconds after which the Session Workload table is auto-refreshed in the Session Activity Analysis dashboard. |
| dash_sess_waits_nowaits_timeout | 300 seconds | Specifies the number of seconds after which the Session Waits By Number Of Waits pie |
| dash_sess_waits_timewait_timeout | 300 seconds | Specifies the number of seconds after which the Session Waits By Time Waited pie chart is auto-refreshed in the Session Waits Analysis dashboard. |
| dash_sess_waits_waitdtl_timeout | 300 seconds | Specifies the number of seconds after which the Session Waits Details table is auto-refreshed in the Session Waits Analysis dashboard. |
| dash_storage_dbdtls_timeout | 300 seconds | Specifies the number of seconds after which the Database Details table is auto-refreshed in the Storage Analysis dashboard. |
| dash_storage_dbovervw_timeout | 300 seconds | Specifies the number of seconds after which the Database Overview pie chart is auto-refreshed in the Storage Analysis dashboard. |
| dash_storage_hostdtls_timeout | 300 seconds | Specifies the number of seconds after which the Host Details table is auto-refreshed |
| dash_storage_hostovervw_timeout | 300 seconds | Specifies the number of seconds after which the Host Overview pie chart is auto-refreshed in the Storage Analysis dashboard. |

continues on next page

Table 1 – continued from previous page

| Parameter name | Value and Unit | Description |
|-----------------------------------|----------------|---|
| dash_storage_tblspcdtl_timeout | 300 seconds | Specifies the number of seconds after which the Tablespace Details table is auto-refreshed in the Storage Analysis dashboard. |
| dash_storage_tblspcovervw_timeout | 300 seconds | Specifies the number of seconds after which the Tablespace Overview pie chart is auto-refreshed in the Storage Analysis dashboard. |
| dash_sys_waits_nowaits_timeout | 300 seconds | Specifies the number of seconds after which the System Waits By Number Of Waits pie chart is auto-refreshed in the System Waits Analysis dashboard. |
| dash_sys_waits_timewait_timeout | 300 seconds | Specifies the number of seconds after which the System Waits By Time Waited pie chart is auto-refreshed in the System Waits Analysis dashboard. |
| dash_sys_waits_waitdtl_timeout | 300 seconds | Specifies the number of seconds after which the System Waits Details table is auto-refreshed in the System Waits Analysis dashboard. |
| deleted_charts_retention_time | 7 days | Specifies the number of days that a custom chart (displayed on a user-defined dashboard) is stored. |
| deleted_probes_retention_time | 7 days | Specifies the number of days that a custom probe (displayed on a user-defined dashboard) is stored. |
| download_chart_format | jpeg | Specifies the format in which a downloaded chart will be stored. May be jpeg or png. |
| flapping_detection_state_change | 3 | Specifies the number of state changes detected within a specified interval to define a given alert as flapping. |
| job_retention_time | 30 days | Specifies the number of days that non-recurring scheduled tasks and their associated |
| long_running_transaction_minutes | 5 minutes | Specifies the number of minutes a query executes for before being considered long running. |
| nagios_cmd_file_name | <file_name> | Specifies nagios command file to which passive service check result will be sent. |
| nagios_enabled | t | Specifies whether alert notification will be submitted to nagios or not. |
| nagios_medium_alert_as_critical | f | Specifies whether medium level PEM alert will be considered as critical in nagios. |
| nagios_spool_retention_time | 7 days | Specifies the number of days to retain nagios messages in the spool table before they are discarded. |
| probe_log_retention_time | 30 days | Specifies the number of days that probe log records are retained. |

continues on next page

Table 1 – continued from previous page

| Parameter name | Value and Unit | Description |
|--------------------------------|----------------|--|
| reminder_notification_interval | 24 hours | Specifies the number of hours after which a reminder email is sent in case an alert has not been cleared. |
| server_log_retention_time | 30 days | Specifies the number of days that the server log is retained on the PEM server. |
| show_data_tab_on_graph | false | If 'true', a Data tab is added to each graph. Select the Data tab to review the data that is plotted on the graph. |
| smtp_authentication | false | Specifies whether to enable/disable authentication over SMTP. |
| smtp_enabled | true | Specifies whether to enable/disable sending of emails. |
| smtp_encryption | false | Specifies whether to send SMTP email using an encrypted connection. |
| smtp_password | | Specifies the password to be used to connect to the SMTP server. |
| smtp_port | 25 | Specifies the SMTP server port to be used for sending email. |
| smtp_server | 127.0.0.1 | Specifies the SMTP server host address to be used for sending email. |
| smtp_spool_retention_time | 7 days | Specifies the number of days to retain sent email messages in the spool table before they are discarded. |
| smtp_username | | Specifies the username to be used to connect to SMTP server. |
| snmp_community | public | Specifies the SNMP community used when sending traps. Used only with SNMPv1 and SNMPv2. |
| snmp_enabled | true | Specifies whether to enable/disable sending SNMP traps. |
| snmp_port | 162 | Specifies the SNMP server port to be used for sending SNMP traps. |
| snmp_server | 127.0.0.1 | Specifies the SNMP server host address to be used for sending SNMP traps. |
| snmp_spool_retention_time | 7 days | Specifies the number of days to retain sent traps in the spool table before they are discarded. |
| snmp_security_name | | Specifies the user name or security name for sending SNMP traps. Used only with SNMPv3. |
| snmp_security_engine_id | | Specifies the Engine id of the SNMP Agent on the SNMP Server. Used only with SNMPv3. |
| snmp_security_level | NOAUTH_NOPRIV | Specifies Security level and its possible values can be: AUTH_NOPRIV - Authentication, No Privacy or AUTH_PRIV - Authentication, Privacy or NOAUTH_NOPRIV - no Authentication, no Privacy. |
| | | Used only with SNMPv3. |

continues on next page

Table 1 – continued from previous page

| Parameter name | Value and Unit | Description |
|------------------------------|-----------------------------------|---|
| snmp_context_name | | Specifies the Context name, the identifier for MIB objects when sending SNMP traps. Used only with SNMPv3 |
| snmp_context_engine_id | | Specifies the Context engine id, the identifier for MIB objects when sending SNMP traps. If not specified, snmp_security_engine_id will be used. Used only with SNMPv3. |
| snmp_authentication_protocol | NONE | Specifies the authentication type for SNMP traps. Its possible values can be NONE, HMACMD5 or HMACSHA. Used only with SNMPv3. |
| snmp_privacy_protocol | NONE | Specifies the privacy protocol for SNMP traps. Its possible values can be NONE, DES, AES128, IDEA, AES192, or AES256. Used only with SNMPv3. |
| snmp_authentication_password | | Specifies the authentication password associated with security name mentioned in snmp_security_name. Used only for SNMPv3. |
| snmp_privacy_password | | Specifies the privacy password associated with security name mentioned in snmp_security_name. Used only for SNMPv3. |
| webclient_help_pg | EnterpriseDB hosted documentation | Specifies the location of the online PostgreSQL core documentation. |

16.2 Capacity Manager Metrics - Reference

Please Note that the Capacity Manager metrics available will vary by platform, and are subject to change. The available metrics may include the metrics described in the table below.

| Metric Name | Description |
|--------------------------------------|---|
| # Dead Tuples | The number of dead tuples in the selected table. |
| # Dead Tuples+ | The cumulative number of dead tuples in the selected table. |
| # Heap Tuples Fetched by Index Scans | The number of heap tuples fetched by index scans. |
| # Heap Tuples Fetched by Index Scans | The cumulative number of heap tuples fetched by index scans. |
| # Idle Backends+ | The cumulative number of currently idle backend clients. |
| # Index Scans | The number of index scans performed on the specified object. |
| # Index Scans+ | The cumulative number of index scans performed on the specified object. |
| # Index Tuples Read | The number of index tuples read. |
| # Index Tuples Read+ | The cumulative number of index tuples read. |
| # Live Tuples | The number of tuples visible to transactions. |
| # Live Tuples+ | The cumulative number of tuples visible to transactions. |
| # Pages Estimated by ANALYZE | The number of pages estimated by ANALYZE. |
| # Pages Estimated by ANALYZE+ | The cumulative number of pages estimated by ANALYZE. |

continues on next page

Table 2 – continued from previous page

| Metric Name | Description |
|----------------------------------|---|
| # Sequential Scans | The number of sequential scans performed on the specific table. |
| # Sequential Scans+ | The cumulative number of sequential scans performed on the specific table. |
| # Sequential Scan Tuples | The number of tuples sequentially scanned in the specific table. |
| # Sequential Scan Tuples+ | The cumulative number of tuples sequentially scanned in the specific table. |
| # Tuples Deleted | The number of tuples deleted. |
| # Tuples Deleted+ | The cumulative number of tuples deleted. |
| # Tuples Estimated by ANALYZE | The number of live (visible) tuples estimated by ANALYZE. |
| # Tuples Estimated by ANALYZE+ | The cumulative number of live tuples estimated by ANALYZE. |
| # Tuples HOT Updated | The number of tuples HOT updated. In a HOT update, the new tuple resides in the same block as the original tuple and the tuples share an index entry. |
| # Tuples HOT Updated+ | The cumulative number of tuples HOT updated. |
| # Tuples Inserted | The number of tuples inserted into the specified table. |
| # Tuples Inserted+ | The cumulative number of tuples inserted into the specified table. |
| # Tuples Updated | The number of tuples updated in the selected table. |
| # Tuples Updated+ | The cumulative number of tuples updated in the selected table. |
| Blocks Hit | The number of blocks found in the cache. |
| Blocks Hit+ | The cumulative number of blocks found in the cache. |
| Blocks Read | The number of blocks read. |
| Blocks Read+ | The cumulative number of blocks read. |
| Blocks Read from InfiniteCache | The number of blocks read from InfiniteCache. |
| Blocks Read from InfiniteCache+ | The cumulative number of blocks read from InfiniteCache. |
| Blocks Written | The number of blocks written. |
| Blocks Written+ | The cumulative number of blocks written. |
| Buffers Allocated | The number of buffers allocated. |
| Buffers Allocated+ | The cumulative number of buffers allocated. |
| Buffers Written - Backends | The number of buffer blocks written to disk by server processes (processes connected to a client application). |
| Buffers Written - Backends+ | The cumulative number of buffer blocks written to disk by server processes. |
| Buffers Written - Checkpoint | The number of blocks written to disk by the checkpoint process. |
| Buffers Written - Checkpoint+ | The cumulative number of blocks written to disk by the checkpoint process. |
| Buffers Written - Cleaning Scan | The number of blocks written to disk by the autovacuum process. |
| Buffers Written - Cleaning Scan+ | The cumulative number of blocks written to disk by the autovacuum process. |
| Bytes Received (KB) | The number of bytes received from the client (in kilobytes). |
| Bytes Received (KB)+ | The cumulative number of bytes received (in kilobytes). |
| Bytes Sent (KB) | The number of bytes sent to the client (in kilobytes). |
| Bytes Sent (KB)+ | The cumulative number of bytes sent (in kilobytes). |
| Checkpoints - Timed | The number of checkpoint operations triggered by the checkpoint interval. |
| Checkpoints - Timed+ | The cumulative number of checkpoint operations triggered by the checkpoint interval. |
| Checkpoints - Untimed | The number of checkpoint operations triggered by checkpoint size. |
| Checkpoints - Untimed+ | The cumulative number of checkpoint operations triggered by checkpoint size. |
| Database Size (MB) | The size of the specified database (in megabytes). |

continues on next page

Table 2 – continued from previous page

| Metric Name | Description |
|--------------------------------------|--|
| Free RAM Memory | The amount of free RAM memory (in megabytes). |
| Free Swap Memory | The amount of free swap space on disk (in megabytes). |
| Heap Blocks Hit | The number of heap blocks found in the cache. |
| Heap Blocks Hit+ | The cumulative number of heap blocks found in the cache. |
| Heap Blocks Read | The number of heap blocks read. |
| Heap Blocks Read+ | The cumulative number of heap blocks read. |
| Index Blocks Hit | The number of index blocks found in the cache. |
| Index Blocks Hit+ | The cumulative number of index blocks found in the cache. |
| Index Blocks Read | The number of index blocks read. |
| Index Blocks Read+ | The cumulative number of index blocks read. |
| Index Size (MB) | The size of the specified index (in megabytes). |
| In Packets Discards | The number of inbound packets discarded. |
| In Packets Discards+ | The cumulative number of inbound packets discarded. |
| In Packets Errors | The number of inbound packets that contain errors. |
| In Packets Errors+ | The cumulative number of inbound packets that contain errors. |
| Link Bandwidth (Mbit/s) | The speed of the network adapter (in megabits per second). |
| Load Average - 15 Minute | CPU saturation (in percent) - 15 minute sampling average. |
| Load Average - 1 Minute | CPU saturation (in percent) - 1 minute sampling average. |
| Load Average - 5 Minute | CPU saturation (in percent) - 5 minute sampling average. |
| Load Percentage | CPU saturation in percent. |
| Number of Prepared Transactions+ | The cumulative number of prepared transactions. |
| Number of WAL Files+ | The cumulative number of write-ahead log files. |
| Out Packets Discards | The number of outbound packets discarded. |
| Out Packets Discards+ | The cumulative number of outbound packets discarded. |
| Out Packets Errors | The number of outbound packets that contain errors. |
| Out Packets Errors+ | The cumulative number of outbound packets that contain errors. |
| Packets Received | The number of packets received. |
| Packets Received+ | The cumulative number of packets received. |
| Packets Sent | The number of packets sent. |
| Packets Sent+ | The cumulative number of packets sent. |
| Size (MB) | The total size of the disk (in megabytes). |
| Size of Indexes (MB) | The size of indexes on the specified table (in megabytes). |
| Space Available (MB) | The current disk space available (in megabytes). |
| Space Used (MB) | The current disk space used (in megabytes). |
| Table Size (MB) | The size of the specified table (in megabytes). |
| Tablespace Size (MB) | The size of the specified tablespace (in megabytes). |
| Temp Buffers (MB) | The size of temporary buffers (in megabytes). |
| Toast Blocks Hit | The number of TOAST blocks found in the cache. |
| Toast Blocks Hit+ | The cumulative number of TOAST blocks found in the cache. |
| Toast Blocks Read | The number of TOAST blocks read. |
| Toast Blocks Read+ | The cumulative number of TOAST blocks read. |
| Total RAM Memory | The total amount of RAM memory on the system (in megabytes). |
| Total Swap Memory | The total amount of swap space on the system (in megabytes). |
| Total Table Size w/Indexes and Toast | The total size of the specified table (including indexes and associated oversized attributes). |
| Transactions Aborted | The number of aborted transactions. |
| Transactions Aborted+ | The cumulative number of aborted transactions. |
| Transactions Committed | The number of committed transactions. |
| Transactions Committed+ | The cumulative number of committed transactions. |

continues on next page

Table 2 – continued from previous page

| Metric Name | Description |
|------------------------------|--|
| Tuples Deleted | The number of tuples deleted from the specified table. |
| Tuples Deleted+ | The cumulative number of tuples deleted from the specified table. |
| Tuples Estimated by ANALYZE | The number of visible tuples in the specified table. |
| Tuples Estimated by ANALYZE+ | The cumulative number of visible tuples in the specified table. |
| Tuples Fetched | The number of tuples fetched from the specified table. |
| Tuples Fetched+ | The cumulative number of tuples fetched from the specified table. |
| Tuples HOT Updated | The number of tuples HOT updated. In a HOT update, the new tuple resides in the same block as the original tuple and the tuples share an index entry. |
| Tuples HOT Updated+ | The cumulative number of tuples HOT updated. In a HOT update, the new tuple resides in the same block as the original tuple and the tuples share an index entry. |
| Tuples Inserted | The number of tuples inserted into the specified table. |
| Tuples Inserted+ | The cumulative number of tuples inserted into the specified table. |
| Tuples Returned | The number of tuples returned in result sets. |
| Tuples Returned+ | The cumulative number of tuples returned in result sets. |
| Tuples Updated | The number of tuples updated in the specified table. |
| Tuples Updated+ | The cumulative number of tuples updated in the specified table. |
| WAL Segment Size (MB) | The segment size of the write-ahead log (in megabytes). |

Note: The '+' following the name of a metric signifies that the data for the metric is gathered cumulatively; those metrics that are not followed by the '+' sign are collected as a 'point-in-time' value.

16.3 PEM Probes – Reference

A probe is a scheduled task that retrieves information about the database objects that are being monitored by the PEM agent. PEM uses the collected information to build the graphs displayed on each dashboard. The Manage Probes tab (accessed via the Management menu) allows you to modify the data collection schedule and the length of time that PEM will retain information returned by a specific probe.

| Probe Name | Information Monitored by Probe | Level |
|------------------------------|--|--------|
| Background Writer Statistics | This probe monitors information about the background writer. The information includes: The number of timed checkpoints The number of requested checkpoints The number of buffers written (by checkpoint) The number of buffers written (by background writer) The number of background writer cycles The number of background buffers written The number of buffers allocated | Server |
| Blocked Session Information | This probe provides information about blocked sessions. | Server |
| CPU Usage | This probe monitors CPU Usage information. | Agent |

continues on next page

Table 3 – continued from previous page

| Probe Name | Information Monitored by Probe | Level |
|-------------------------------|---|----------|
| Data and Log File Analysis | This probe monitors information about log files. The information includes: The name of the log file The directory in which the log file resides | Server |
| Database Statistics | This probe monitors database statistics. The information includes: The number of backends The number of transactions committed The number of transactions rolled back The number of blocks read The number of blocks hit The number of rows returned The number of rows fetched The number of rows inserted The number of rows updated The number of rows deleted | Server |
| Disk Busy Info | This probe monitors information about disk activity. Note: This probe is not supported on Mac OS X, Solaris or HP-UX | Agent |
| Disk Space | This probe monitors information about disk space usage. The information includes: The amount of disk space used The amount of disk space available | Agent |
| EDB Audit Configuration | This probe monitors the audit logging configuration of EDB Postgres Advanced Server. | Server |
| Failover Manager Cluster Info | This probe monitors a Failover Manager cluster, returning information about the cluster. This probe is disabled unless a cluster name and path of the Failover Manager binary is provided on the Server Properties dialog. | Server |
| Failover Manager Node Status | This probe monitors a Failover Manager cluster, returning detailed about each node within the cluster. This probe is disabled unless a cluster name and path of the Failover Manager binary is provided on the Server Properties dialog. | Server |
| Function Statistics | This probe monitors a database, retrieving information about functions. The information includes: Function names Argument types Return values | Database |
| Index Size | This probe monitors a database, retrieving information about indexes. The information includes: The name of the index The time the data was gathered The size of the index (in MB's) | Database |
| Index Statistics | This probe monitors index statistics. The information includes: The number of index scans The number of rows read The number of rows fetched The number of blocks read The number of blocks hit | Database |

continues on next page

Table 3 – continued from previous page

| Probe Name | Information Monitored by Probe | Level |
|---------------------------------|--|--------|
| Installed Packages | This probe monitors the packages that are currently installed. The information gathered includes: The name of the installed package The version of the installed package The date and time that the probe executed | Agent |
| IO Analysis | This probe monitors disk I/O information in. The information includes: The number of blocks read The number of blocks written The date and time that the probe executed Note: This probe is not supported on Mac OS X | Agent |
| Load Average | This probe monitors CPU load averages. The information includes: The 1-minute load average The 5-minute load average The 15-minute load average Note: This probe is not supported on Windows | Agent |
| Lock Information | This probe monitors lock information. The information includes: The database name The lock type The lock mode The process holding the lock | Server |
| Memory Usage | This probe monitors information about system memory usage. | Agent |
| Network Statistics | This probe monitors network statistics. The information includes: The interface IP address The number of packets sent The number of packets received The number of bytes sent The number of bytes received The link speed (in MB/second) | Agent |
| Number of Prepared Transactions | This probe stores the number of prepared transactions. | Server |
| Number of WAL Files | This probe monitors the number of WAL files. | Server |
| Object Catalog: Database | This probe monitors a list of databases and their properties. The information includes: The database name The database encoding type If the database allows user connections or system connections | Server |
| Object Catalog: Foreign Key | This probe monitors a list of foreign keys and their properties. The information includes: The name of the table that contains the foreign key The name of the table that the foreign key references The name of the database in which the table resides The name of the schema in which the table resides | Schema |

continues on next page

Table 3 – continued from previous page

| Probe Name | Information Monitored by Probe | Level |
|------------------------------|--|----------|
| Object Catalog: Function | This probe monitors a list of functions and their properties. The information includes: The name of the function The name of the schema in which the function resides The name of the database in which the function resides | Schema |
| Object Catalog: Index | This probe monitors a list of indexes and their properties. The information includes: The name of the index The name of the table that the index is associated with The name of the database in which the indexed table resides | Schema |
| Object Catalog: Schema | This probe monitors a list of schemas and their associated databases and servers. | Database |
| Object Catalog: Sequence | This probe monitors a list of sequences and their properties. | Schema |
| Object Catalog: Table | This probe monitors a list of table information. The information includes: The table name The name of the schema in which the table resides The name of the database in which the schema resides A Boolean indicator that indicates if the table has a primary key | Schema |
| Object Catalog: Tablespace | This probe monitors a list of tablespaces. | Server |
| Operating System Information | This probe monitors the operating system details and boot time. | Agent |
| Package Catalog | This probe monitors the packages that are currently available for installation. The information gathered includes: The package name The package version | Agent |
| PG HBA Conf | This probe monitors authentication configuration information from the <code>pg_hba.conf</code> file. | Server |
| Server Information | This probe monitors server information. | Server |
| Session Information | This probe monitors session information. The information includes: The name of the session user The date and time that the session connected to the server The status of the session at the time that the information was gathered (idle, waiting, etc) The client address and port number | Server |
| Settings | This probe monitors the values currently assigned to GUC variables. | Server |
| SQL Protect | This probe monitors a server, retrieving information about SQL injection attacks. | Server |
| Slony Replication | This probe monitors lag data for clusters replicated using Slony. | Database |

continues on next page

Table 3 – continued from previous page

| Probe Name | Information Monitored by Probe | Level |
|--|---|----------|
| Streaming Replication | This probe monitors a cluster that is using streaming replication, retrieving information about: The sent Xlog location (in bytes) The write Xlog location (in bytes) The flush Xlog location (in bytes) The replay Xlog location (in bytes) The Xlog lag (in segments) The Xlog lag (in pages) | Server |
| Streaming Replication Lag Time | This probe monitors a cluster that is using streaming replication, retrieving lag information about: Replication lag time (in seconds) Current status of replication (running/paused) | Server |
| Streaming Replication Database Conflicts | This probe monitors a database that is using streaming replication, retrieving information about any conflicts that arise. This includes information about queries that have been canceled due to: The # of drop tablespace conflicts The # of lock timeout conflicts The # of old snapshot conflicts The # of pinned buffer conflicts The # of deadlock conflicts | Server |
| Table Bloat | This probe monitors information about the current table bloat. The information includes: The name of the table The name of the schema in which the table resides The estimated number of pages The estimated number of wasted pages The estimated number of bytes per row | Database |
| Table Frozen XID | This probe monitors the frozen XID of each table. | Schema |
| Table Size | This probe monitors table statistics. The information includes: The number of sequential scans The number of sequential scan rows The number of index scans The number of index scan rows The number of rows inserted The number of rows updated The number of rows deleted The number of live rows The number of dead rows The last VACUUM The last auto-vacuum The last ANALYZE The last auto-analyze The number of pages estimated by ANALYZE The number of rows estimated by ANALYZE | Database |
| Table Statistics | This probe monitors a list of tablespaces and their sizes. | Server |
| Tablespace Size | This probe monitors a list of tablespaces and their sizes. | Server |

continues on next page

Table 3 – continued from previous page

| Probe Name | Information Monitored by Probe | Level |
|--------------------|---|----------|
| User Information | This probe monitors a list of the current users. The stored information includes: The user name The user type (superuser vs. non-superuser) The server to which the user is connected | Server |
| WAL Archive Status | This probe monitors the status of the WAL archive. The stored information includes: The # of WAL archives done The # of WAL archives pending The last archive time The # of WAL archives failed The time of the last failure | Server |
| xDB Replication | This probe monitors lag data for clusters replicated using xDB replication. | Database |

16.4 PEM Pre-defined Alert Templates – Reference

An alert definition contains a system-defined or user-defined set of conditions that PEM compares to the system statistics; if the statistics deviate from the boundaries specified for that statistic, the alert triggers, and the PEM client displays a warning on the **Alerts Overview** page, and optionally sends a notification to a monitoring user.

The tables that follow list the system-defined alert templates that you can use to create an alert; please note that this list is subject to change, and may vary by system:

16.4.1 Templates applicable on Agent

| Template Name | Description |
|--|---|
| Load Average (1 minute) | 1-minute system load average. |
| Load Average (5 minutes) | 5-minute system load average. |
| Load Average (15 minutes) | 15-minute system load average. |
| Load Average per CPU Core (1 minutes) | 1-minute system load average per CPU core. |
| Load Average per CPU Core (5 minutes) | 5-minute system load average per CPU core. |
| Load Average per CPU Core (15 minutes) | 15-minute system load average per CPU core. |
| CPU utilization | Average CPU consumption. |
| Number of CPUs running higher than a | Number of CPUs running at greater than K% utilization threshold |
| Free memory percentage | Free memory as a percent of total system memory. |
| Memory used percentage | Percentage of memory used. |
| Swap consumption | Swap space consumed (in megabytes). |
| Swap consumption percentage | Percentage of swap area consumed. |
| Disk Consumption | Disk space consumed (in megabytes). |
| Disk consumption percentage | Percentage of disk consumed. |
| Disk Available | Disk space available (in megabytes). |
| Disk busy percentage | Percentage of disk busy. |
| Most used disk percentage | Percentage used of the most utilized disk on the system. |
| Total table bloat on host | The total space wasted by tables on a host, in MB. |
| Highest table bloat on host | The most space wasted by a table on a host, in MB. |

continues on next page

Table 4 – continued from previous page

| Template Name | Description |
|--|---|
| Average table bloat on host | The average space wasted by tables on host, in MB. |
| Table size on host | The size of tables on host, in MB. |
| Database size on host | The size of databases on host, in MB. |
| Number of ERRORS in the logfile on agent N in last X hours. | The number of ERRORS in the logfile on agent N in last X hours |
| Number of WARNINGS in the logfile on agent N in last X hours | The number of WARNINGS in the logfile on agent N in last X hours. |
| Number of WARNINGS or ERRORS in the logfile on agent N in last X hours | The number of WARNINGS or ERRORS in the logfile on agent N in last X hours. |
| Package version mismatch | Check for package version mismatch as per catalog. |
| Total materialized view bloat on host | The total space wasted by materialized views on a host, in MB. |
| Highest materialized view bloat on host | The most space wasted by a materialized view on a host, in MB. |
| Average materialized view bloat on host | The average space wasted by materialized views on host, in MB. |
| Materialized view size on host | The size of materialized views on host, in MB. |
| Agent Down | Specified agent is currently down. |

16.4.2 Templates applicable on Server

| Template Name | Description |
|--|---|
| Total table bloat in server | The total space wasted by tables in server, in MB. |
| Largest table (by multiple of unbloated size) | Largest table in server, calculated as a multiple of its own estimated unbloated size; exclude tables smaller than N MB. |
| Highest table bloat in server | The most space wasted by a table in server, in MB. |
| Average table bloat in server | The average space wasted by tables in server, in MB. |
| Table size in server | The size of tables in server, in MB. |
| Database size in server | The size of databases in server, in MB. |
| Number of WAL files | Total number of Write Ahead Log files. |
| Number of prepared transactions | Number of transactions in prepared state. |
| Total connections | Total number of connections in the server. |
| Total connections as percentage of max_connections | Total number of connections in the server as a percentage of maximum |
| Unused, non-superuser connections | Number of unused, non-superuser connections on the server, user_info, settings. |
| Unused, non-superuser connections as percentage of max_connections | Number of unused, non-superuser connections on the server as a percentage of max_connections of max_connections, user_info, settings. |
| Ungranted locks | Number of ungranted locks in server. |
| Percentage of buffers written by backends | The percentage of buffers written by backends vs. the total buffers written. |
| Percentage of buffers written by checkpoint | The percentage of buffers written by the checkpoints vs. the total buffers written. |
| Buffers written per second | Number of buffers written per second, over the last two probe cycles. |

continues on next page

Table 5 – continued from previous page

| Template Name | Description |
|--|--|
| Buffers allocated per second | Number of buffers allocated per second, over the last two probe cycles. |
| Connections in idle state | Number of connections in server that are in idle state. |
| Connections in idle-in-transaction state | Number of connections in server that are in idle-in-transaction state. |
| Connections in idle-in-transaction state, as percentage of max_connections | Number of connections in server that are in idle-in-transaction state, as a percentage of maximum connections allowed on server, settings. |
| Long-running idle connections | Number of connections in the server that have been idle for more than N seconds. |
| Long-running idle connections and idle transactions | Number of connections in the server that have been idle or transactions idle-in-transaction for more than N seconds. |
| Long-running idle transactions | Number of connections in the server that have been idle in transaction for more than N seconds. |
| Long-running transactions | Number of transactions in server that have been running for more than N seconds. |
| Long-running queries | Number of queries in server that have been running for more than N seconds. |
| Long-running vacuums | Number of vacuum operations in server that have been running for more than N seconds. |
| Long-running autovacuum | Number of autovacuum operations in server that have been running for more than N seconds. |
| Committed transactions percentage | Percentage of transactions in the server that committed vs. that rolled-back over last N minutes. |
| Shared buffers hit percentage | Percentage of block read requests in the server that were satisfied by shared buffers, over last N minutes. |
| Tuples inserted | Tuples inserted into server over last N minutes. |
| InfiniteCache buffers hit percentage | Percentage of block read requests in the server that were satisfied by InfiniteCache, over last N minutes. |
| Tuples fetched | Tuples fetched from server over last N minutes. |
| Tuples returned | Tuples returned from server over last N minutes. |
| Dead Tuples | Number of estimated dead tuples in server. |
| Tuples updated | Tuples updated in server over last N minutes. |
| Tuples deleted | Tuples deleted from server over last N minutes. |
| Tuples hot updated | Tuples hot updated in server, over last N minutes. |
| Sequential Scans | Number of full table scans in server, over last N minutes. |
| Index Scans | Number of index scans in server, over last N minutes. |
| Hot update percentage | Percentage of hot updates in the server over last N minutes. |
| Live Tuples | Number of estimated live tuples in server. |
| Dead tuples percentage | Percentage of estimated dead tuples in server. |
| Last Vacuum | Hours since last vacuum on the server. |
| Last AutoVacuum | Hours since last autovacuum on the server. |
| Last Analyze | Hours since last analyze on the server. |
| Last AutoAnalyze | Hours since last autoanalyze on the server. |
| Percentage of buffers written by backends over the last N minutes | The percentage of buffers written by backends vs. the total buffers backends over last N |
| Table Count | Total number of tables in server. |
| Function Count | Total number of functions in server. |

continues on next page

Table 5 – continued from previous page

| Template Name | Description |
|---|--|
| Sequence Count | Total number of sequences in server. |
| A user expires in N days | Number of days before a user's validity expires. |
| Index size as a percentage of table size | Size of the indexes in server, as a percentage of their tables' size. |
| Largest index by table-size percentage oc_index, table_size. | Largest index in server, calculated as percentage of its table's size. |
| Number of ERRORS in the logfile on server M in the last X hours | The number of ERRORS in the logfile on server M in last X hours. |
| Number of WARNINGS in the logfile on server M in the last X hours | The number of WARNINGS in logfile on server M in the last X hours. |
| Number of WARNINGS or ERRORS in the logfile on server M in the last X hours | The number of WARNINGS or ERRORS in the logfile on server M in the last X hours. |
| Number of attacks detected in the last N minutes | The number of SQL injection attacks occurred in the last N minutes. |
| Number of attacks detected in the last N minutes by username | The number of SQL injection attacks occurred in the last N minutes by username. |
| Number of standby servers lag behind the master by write location | Streaming Replication: number of standby servers lag behind the master by write location. |
| Number of standby servers lag behind the master by flush location | Streaming Replication: number of standby servers lag behind the master by flush location. |
| Number of standby servers lag behind the master by replay location | Streaming Replication: number of standby servers lag behind the master by replay location. |
| Standby server lag behind the master by write location | Streaming Replication: standby server lag behind the master by write location in MB. |
| Standby server lag behind the master by flush location | Streaming Replication: standby server lag behind the master by flush location in MB. |
| Standby server lag behind the master by replay location | Streaming Replication: standby server lag behind the master by replay location in MB. |
| Standby server lag behind the master by size (MB) | Streaming Replication: standby server lag behind the master by size in MB. |
| Standby server lag behind the master by WAL segments | Streaming Replication: standby server lag behind the master by WAL segments. |
| Standby server lag behind the master by WAL pages | Streaming Replication: standby server lag behind the master by WAL pages. |
| Total materialized view bloat in server | The total space wasted by materialized views in server, in MB. |
| Largest materialized view (by multiple of unbloated size) | Largest materialized view in server, calculated as a multiple of its own estimated unbloated size; exclude materialized views smaller than N MB. |
| Highest materialized view bloat in server | The most space wasted by a materialized view in server, in MB. |
| Average materialized view bloat in server | The average space wasted by materialized views in server, in MB. |
| Materialized view size in server | The size of materialized view in server, in MB. |
| View Count | Total number of views in server. |
| Materialized View Count | Total number of materialized views in server. |
| Audit config mismatch | Check for audit config parameter mismatch |
| Server Down | Specified server is currently inaccessible. |
| Number of WAL archives pending | Streaming Replication: number of WAL files pending to be replayed at standby. |

continues on next page

Table 5 – continued from previous page

| Template Name | Description |
|--|--|
| Number of minutes lag of standby server from master server | Streaming Replication: number of minutes standby node is lagging behind the master node. |
| Log config mismatch | Check for log config parameter mismatch. |

16.4.3 Templates applicable on Database

| Template Name | Description |
|---|--|
| Total table bloat in database | The total space wasted by tables in database, in MB. |
| Largest table (by multiple of unbloated size) | Largest table in database, calculated as a multiple of its own estimated unbloated size; exclude tables smaller than N MB. |
| Highest table bloat in database | The most space wasted by a table in database, in MB. |
| Average table bloat in database | The average space wasted by tables in database, in MB. |
| Table size in database | The size of tables in database, in MB. |
| Database size | The size of the database, in MB. |
| Total connections | Total number of connections in the database. |
| Total connections as percentage of max_connections | Total number of connections in the database as a percentage of maximum connections allowed on server, settings. |
| Ungranted locks | Number of ungranted locks in database. |
| Connections in idle state | Number of connections in database that are in idle state. |
| Connections in idle-in-transaction state | Number of connections in database that are in idle-in-transaction state |
| Connections in idle-in-transaction state,as percentage of max_connections | Number of connections in database that are in idle-in-transaction state, as a percentage of maximum connections allowed on server, settings. |
| Long-running idle connections | Number of connections in the database that have been idle for more than N seconds. |
| Long-running idle connections and idle transactions | Number of connections in the database that have been idle or idle-in-transaction for more than N seconds. |
| Long-running idle transactions | Number of connections in the database that have been idle in transaction for more than N seconds. |
| Long-running transactions | Number of transactions in database that have been running for more than N seconds. |
| Long-running queries | Number of queries in database that have been running for more than N seconds. |
| Long-running vacuums | Number of vacuum operations in database that have been running for more than N seconds. |
| Long-running autovacuids | Number of autovacuum operations in database that have been running for more than N seconds. |
| Committed transactions percentage | Percentage of transactions in the database that committed vs. that rolled-back over last N minutes. |
| Shared buffers hit percentage | Percentage of block read requests in the database that were satisfied by shared buffers, over last N minutes. |
| InfiniteCache buffers hit percentage | Percentage of block read requests in the database that were satisfied by InfiniteCache, over last N minutes. |
| Tuples fetched | Tuples fetched from database over last N minutes. |
| Tuples returned | Tuples returned from database over last N minutes. |

continues on next page

Table 6 – continued from previous page

| Template Name | Description |
|---|---|
| Tuples inserted | Tuples inserted into database over last N minutes. |
| Tuples updated | Tuples updated in database over last N minutes. |
| Tuples deleted | Tuples deleted from database over last N minutes. |
| Tuples hot updated | Tuples hot updated in database, over last N minutes. |
| Sequential Scans | Number of full table scans in database, over last N minutes. |
| Index Scans | Number of index scans in database, over last N minutes. |
| Hot update percentage | Percentage of hot updates in the database over last N minutes. |
| Live Tuples | Number of estimated live tuples in database. |
| Dead Tuples | Number of estimated dead tuples in database. |
| Dead tuples percentage | Percentage of estimated dead tuples in database. |
| Last Vacuum | Hours since last vacuum on the database. |
| Last AutoVacuum | Hours since last autovacuum on the database. |
| Last Analyze | Hours since last analyze on the database. |
| Last AutoAnalyze | Hours since last autoanalyze on the database. |
| Table Count | Total number of tables in database. |
| Function Count | Total number of functions in database. |
| Sequence Count | Total number of sequences in database. |
| Index size as a percentage of table size | Size of the indexes in database, as a percentage of their tables' size. |
| Largest index by table-size percentage | Largest index in database, calculated as percentage of its table's size, oc_index, table_size. |
| Database Frozen XID | The age (in transactions before the current transaction) of the database's frozen transaction ID. |
| Number of attacks detected in the | The number of SQL injection attacks occurred in the last N minutes. last N minutes |
| Number of attacks detected in the | The number of SQL injection attacks occurred in the last N minutes by last N minutes by username. |
| Queries that have been cancelled due to dropped tablespaces | Streaming Replication: number of queries that have been cancelled due to dropped tablespaces. |
| Queries that have been cancelled due to lock timeouts | Streaming Replication: number of queries that have been cancelled due to lock timeouts. |
| Queries that have been cancelled due to old snapshots | Streaming Replication: number of queries that have been cancelled due to old snapshots. |
| Queries that have been cancelled due to pinned buffers | Streaming Replication: number of queries that have been cancelled due to pinned buffers. |
| Queries that have been cancelled due to deadlocks | Streaming Replication: number of queries that have been cancelled due to deadlocks. |
| Total events lagging in all slony clusters | Slony Replication: total events lagging in all slony clusters. |
| Events lagging in one slony cluster | Slony Replication: events lagging in one slony cluster. |
| Lag time (minutes) in one slony cluster | Slony Replication: lag time (minutes) in one slony cluster. |
| Total rows lagging in xdb single master replication | xDB Replication: Total rows lagging in xdb single master replication |
| Total rows lagging in xdb multi master replication | xDB Replication: Total rows lagging in xdb multi master replication. |
| Total materialized view bloat in database | The total space wasted by materialized views in database, in MB. |

continues on next page

Table 6 – continued from previous page

| Template Name | Description |
|---|--|
| Largest materialized view (by multiple of unbloated size) | Largest materialized view in database, calculated as a multiple of its estimated unbloated size; exclude materialized views smaller than N MB. |
| Highest materialized view bloat in database | The most space wasted by a materialized view in database, in MB. |
| Average materialized view bloat in database | The average space wasted by materialized views in database, in MB. |
| Materialized view size in database | The size of materialized view in database, in MB. |
| View Count | Total number of views in database. |
| Materialized View Count | Total number of materialized views in database. |

16.4.4 Templates applicable on Schema

| Template Name | Description |
|---|--|
| Total table bloat in schema | The total space wasted by tables in schema, in MB. |
| Largest table (by multiple of unbloated size) | Largest table in schema, calculated as a multiple of its own estimated unbloated size; exclude tables smaller than N MB. |
| Highest table bloat in schema | The most space wasted by a table in schema, in MB. |
| Average table bloat in schema | The average space wasted by tables in schema, in MB. |
| Table size in schema | The size of tables in schema, in MB. |
| Tuples inserted | Tuples inserted in schema over last N minutes. |
| Tuples updated | Tuples updated in schema over last N minutes. |
| Tuples deleted | Tuples deleted from schema over last N minutes. |
| Tuples hot updated | Tuples hot updated in schema, over last N minutes. |
| Sequential Scans | Number of full table scans in schema, over last N minutes. |
| Index Scans | Number of index scans in schema, over last N minutes. |
| Hot update percentage | Percentage of hot updates in the schema over last N minutes. |
| Live Tuples | Number of estimated live tuples in schema. |
| Dead Tuples | Number of estimated dead tuples in schema. |
| Dead tuples percentage | Percentage of estimated dead tuples in schema. |
| Last Vacuum | Hours since last vacuum on the schema. |
| Last AutoVacuum | Hours since last autovacuum on the schema. |
| Last Analyze | Hours since last analyze on the schema. |
| Last AutoAnalyze | Hours since last autoanalyze on the schema. |
| Table Count | Total number of tables in schema. |
| Function Count | Total number of functions in schema. |
| Sequence Count | Total number of sequences in schema. |
| Index size as a percentage of table size | Size of the indexes in schema, as a percentage of their table's size. |
| Largest index by table-size percentage | Largest index in schema, calculated as percentage of its table's size, oc_index, table_size |
| Materialized View bloat | Space wasted by the materialized view, in MB. |
| Total materialized view bloat in schema | The total space wasted by materialized views in schema, in MB. |

continues on next page

Table 7 – continued from previous page

| Template Name | Description |
|---|---|
| Materialized view size as a multiple of unbloated size | Size of the materialized view as a multiple of estimated unbloated size. |
| Largest materialized view (by multiple of unbloated size) | Largest materialized view in schema, calculated as a multiple of its own estimated unbloated size; exclude materialized view smaller than N MB. |
| Highest materialized view bloat in schema | The most space wasted by a materialized view in schema, in MB. |
| Average materialized view bloat in schema | The average space wasted by materialized views in schema, in MB. |
| Materialized view size | The size of materialized view, in MB. |
| Materialized view size in schema | The size of materialized views in schema, in MB. |
| View Count | Total number of views in schema. |
| Materialized View Count | Total number of materialized views in schema. |
| Materialized View Frozen XID | The age (in transactions before the current transaction) of the materialized view's frozen transaction ID. |

16.4.5 Templates applicable on Table

| Template Name | Description |
|--|--|
| Table bloat | Space wasted by the table, in MB. |
| Table size | The size of table, in MB. |
| Table size as a multiple of unbloated size | Size of the table as a multiple of estimated unbloated size. |
| Tuples inserted | Tuples inserted in table over last N minutes. |
| Tuples updated | Tuples updated in table over last N minutes. |
| Tuples deleted | Tuples deleted from table over last N minutes. |
| Tuples hot updated | Tuples hot updated in table, over last N minutes. |
| Sequential Scans | Number of full table scans on table, over last N minutes. |
| Index Scans | Number of index scans on table, over last N minutes. |
| Hot update percentage | Percentage of hot updates in the table over last N minutes. |
| Live Tuples | Number of estimated live tuples in table. |
| Dead Tuples | Number of estimated dead tuples in table. |
| Dead tuples percentage | Percentage of estimated dead tuples in table. |
| Last Vacuum | Hours since last vacuum on the table. |
| Last AutoVacuum | Hours since last autovacuum on the table. |
| Last Analyze | Hours since last analyze on the table. |
| Last AutoAnalyze | Hours since last autoanalyze on the table. |
| Row Count | Estimated number of rows in a table. |
| Index size as a percentage of table size | Size of the indexes on table, as a percentage of table's size. |
| Table Frozen XID | The age (in transactions before the current transaction) of the table's frozen transaction ID. |

16.4.6 Global Templates

| Template Name | Description |
|---------------|---|
| Agents Down | Number of agents that haven't reported in recently. |
| Servers Down | Number of servers that are currently inaccessible. |
| Alert Errors | Number of alerts in an error state. |

Conclusion

The goal of Postgres Enterprise Manager is provide you with a solution that allows you to intelligently manage all your database servers across your enterprise with a single console. To meet this objective, PEM supplies you with all the core features and functionality needed for visual database administration, as well as a number of advanced components that assist you in managing the performance and design of your database servers.

For more information about Postgres Enterprise Manager, please visit the EnterpriseDB Web site (<http://www.enterprisedb.com>) where you will find PEM's online documentation, as well as other tutorials and educational aids.

EnterpriseDB is the enterprise PostgreSQL company, providing products and services worldwide that are based on and support PostgreSQL, the world's most advanced open source database. EDB's products are ideally suited for transaction-intensive applications requiring superior performance, massive scalability, and compatibility with proprietary database products. EDB's products provide an economical open source alternative or complement to proprietary databases without sacrificing features or quality.

If you would like to discuss training, consulting, or enterprise support options, please contact EnterpriseDB. EnterpriseDB has offices in North America, Europe, and Asia. EnterpriseDB was founded in 2004 and is headquartered in Bedford, MA. For more information, please visit <http://www.enterprisedb.com>.

Sales Inquiries:

sales-us@enterprisedb.com (US)
sales-intl@enterprisedb.com (Intl)
+1-781-357-3390 or 1-877-377-4352 (US Only)

General Inquiries:

info@enterprisedb.com
info.asiapacific@enterprisedb.com (APAC)
info.emea@enterprisedb.com (EMEA)

EDB Postgres Enterprise Manager Enterprise Features Guide

Copyright © 2007 - 2020 EnterpriseDB Corporation. All rights reserved.

EnterpriseDB® Corporation 34 Crosby Drive, Suite 201, Bedford, MA 01730, USA

T +1 781 357 3390 F +1 978 467 1307 E info@enterprisedb.com www.enterprisedb.com

- EDB designs, establishes coding best practices, reviews, and verifies input validation for the logon UI for EDB Postgres Enterprise Manager where present. EDB follows the same approach for additional input components, however the nature of the product may require that it accepts freeform SQL, WMI or other strings to be entered and submitted by trusted users for which limited validation is possible. In such cases it is not possible to prevent users from entering incorrect or otherwise dangerous inputs.
- EDB reserves the right to add features to products that accept freeform SQL, WMI or other potentially dangerous inputs from authenticated, trusted users in the future, but will ensure all such features are designed and tested to ensure they provide the minimum possible risk, and where possible, require superuser or equivalent privileges.
- EDB does not warrant that we can or will anticipate all potential threats and therefore our process cannot fully guarantee that all potential vulnerabilities have been addressed or considered.

EnterpriseDB, EDB Postgres, Postgres Plus, Postgres Enterprise Manager, and DynaTune are trademarks of EnterpriseDB Corporation. Other names may be trademarks of their respective owners. © 2018.

A

Alerting, 57
Audit Log Alerting, 77
Audit Manager, 94

C

Capacity Manager, 88
Conclusion, 188
Configuring Nagios-related behavior of
the PEM Server, 84
Copying a Probe, 56
Copying an Alert, 76
Creating a Custom Alert Template, 62
Creating a Custom Chart, 39
Creating a Custom Dashboard, 32
Creating a Custom Probe, 49
Creating a New Alert, 67
Creating an Email Group, 78
Creating an Ops Dashboard, 36
Customizing Probes, 47

D

Deleting a Probe, 55

E

Enabling Nagios Notification for an
Alert, 82

I

Importing a Capacity Manager Template,
43

L

Log Manager, 105

M

Managing Custom Dashboards, 31
Modifying or Deleting an Alert, 73

Modifying the Nagios Configuration
File, 87
Monitoring an xDB Replication Cluster,
154
Monitoring Failover Manager, 151

P

PEM Query Tool, 3
Performance Diagnostic, 156
Performance Monitoring and Management,
26
Postgres Expert, 140

R

Reference, 162
Reports, 146

S

SQL profiler, 124

T

The PEM Schema Diff Tool, 20
Tuning Wizard, 133

U

Using Dashboards to View Performance
Information, 28
Using PEM with Nagios, 81
Using the Alerts Dashboard, 59
Using the Manage Alerts Tab, 61
Using the Manage Charts tab, 37

W

What's New, 2