PEM Administrator's Guide

Version 8.0

Built at 2021-04-06T08:35:59

0 PEM Administrator's Guide

This document provides an introduction to Postgres Enterprise Manager (PEM). Postgres Enterprise Manager (PEM) is an enterprise management tool designed to assist database administrators, system architects, and performance analysts in administering, monitoring, and tuning PostgreSQL and EDB Advanced Server database servers. PEM is architected to manage and monitor anywhere from a handful, to hundreds of servers from a single console, allowing complete and remote control over all aspects of your databases.

For information about the platforms and versions supported by PEM, visit the EDB website at:

https://www.enterprisedb.com/services-support/edb-supported-products-and-platforms#pem

Please note: PEM 8.0.1 is no longer supported on CentOS/RHEL/OEL 6.x platforms. It is strongly recommended that EDB products running on these platforms be migrated to a supported platform.

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

1 PEM Overview

PEM provides a number of benefits not found in any other PostgreSQL management tool:

- Management en Masse Design. PEM is designed for enterprise database management, and is built to tackle the management of large numbers of servers across geographical boundaries. Global dashboards keep you up to date on the up/down/performance status of all your servers in an at-a-glance fashion.

- Distributed Architecture. PEM is architected in a way that maximizes its ability to gather statistical information and to perform operations remotely on machines regardless of operating system platform.

- Graphical Administration. All aspects of database administration can be carried out in the PEM client via a graphical interface. Server startup and shutdown, configuration management, storage and security control, object creation, performance management, and more can be handled from a single console.

- Full SQL IDE. PEM contains a robust SQL integrated development environment (IDE) that provides ad-hoc SQL querying, stored procedure/function development, and a graphical debugger.

- Enterprise Performance Monitoring. PEM provides enterprise-class performance monitoring for all managed database servers. Lightweight and efficient agents monitor all aspects of each database

server's operations as well as each machine's underlying operating system and provide detailed statistics back to easily navigated performance pages within the interface.

- Proactive Alert Management. PEM ships out-of-the-box with the ability to create performance thresholds for each key metric (e.g. memory, storage, etc.) that are monitored around-the-clock. Any threshold violation results in an alert being sent to a centralized dashboard that communicates the nature of the problem and what actions are necessary to prevent the situation from jeopardizing the overall performance of the server.

- Simplified Capacity Planning. All key performance-related statistics are automatically collected and retained for a specified period of time in PEM's repository. The Capacity Manager utility allows you to select various statistics and perform trend analysis over time to understand things such as peak load periods, storage consumption trends, and much more. A forecasting mechanism in the tool allows you to also forecast resource usage in the future and plan/budget accordingly.

- Audit Manager. The Audit Manager configures audit logging on Advanced Server instances. Activities such as connections to a database, disconnections from a database, and the SQL statements run against a database can be logged. The Audit Log dashboard can then be used to filter and view the log.

- Log Manager. The Log Manager wizard configures server logging parameters, with (optional) log collection into a central table. Use the wizard to specify your preference for logging behaviors such as log file rotation, log destination and error message severity. Use the Server Log dashboard to filter and review the collected server log entries.

- SQL Workload Profiling. PEM contains a SQL profiling utility that allows you to trace the SQL statements that are executed against one or more servers. SQL profiling can either be done in an ad-hoc or scheduled manner. Captured SQL statements can then be filtered so you can easily identify and tune poorly running SQL statements. SQL statements can also be fed into an Index Advisor on Advanced Server that analyzes each statement and makes recommendations on new indexes that should be created to help performance.

- Expert Database Analysis. PEM includes the Postgres Expert utility. Postgres Expert analyzes selected databases for best practice enforcement purposes. Areas such as general configuration, security setup, and much more are examined. Any deviations from recommended best practices are reported back to you, along with an explanation of each particular issue, and expert help on what to do about making things right.

- Streaming Replication Monitoring. You can monitor the the Streaming Replication dashboard or use options on the PEM client to promote a replica node to the primary node.

- Secure Client Connectivity. PEM supports secure client connections through an encrypted SSH tunnel. The full-featured PEM client includes an SSH Tunnel definition dialog that allows you to provide connection information for a secure connection.

- Wide Platform Support. PEM supports most major Linux and Windows platforms.

2 Registering a Server

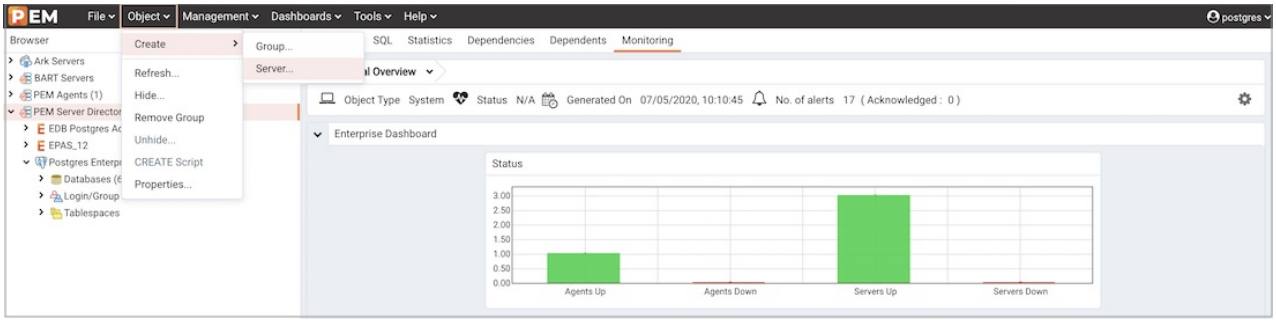
Before you can manage or monitor a server with PEM, you must register the server with PEM, and bind an agent. A server may be bound to a remote agent (an agent that resides on a different host), but if the agent does not reside on the same host, it will not have access to all of the statistical information about the instance.

Manually Registering a Server

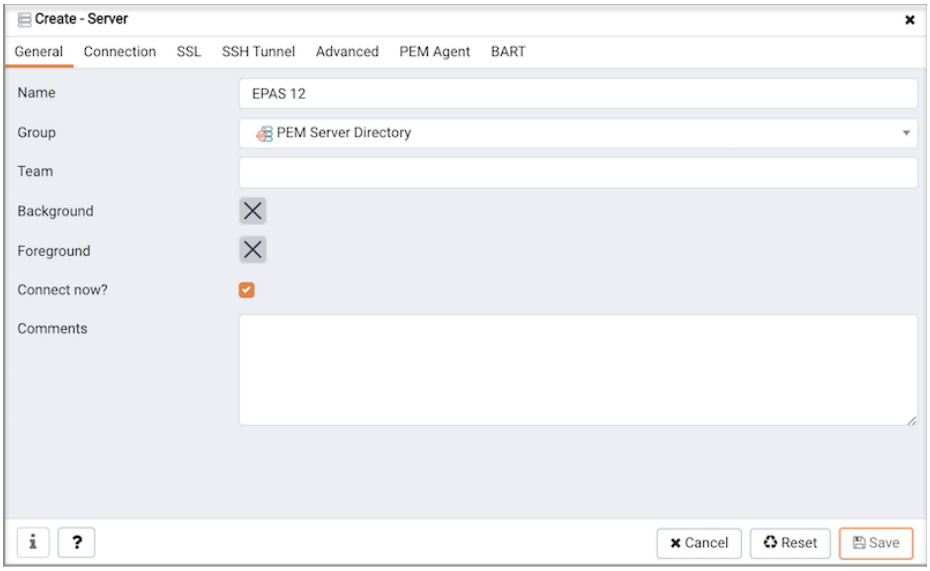
To manage or monitor a server with PEM, you must:

- Register your Advanced Server or PostgreSQL server with the PEM server.
- Bind the server to a PEM agent.

You can use the `Create - Server` dialog to provide registration information for a server, bind a PEM agent, and display the server in PEM client tree control. To open the `Create - Server` dialog, navigate through the `Create` option on the `Object` menu (or the context menu of a server group) and select `Server…`.

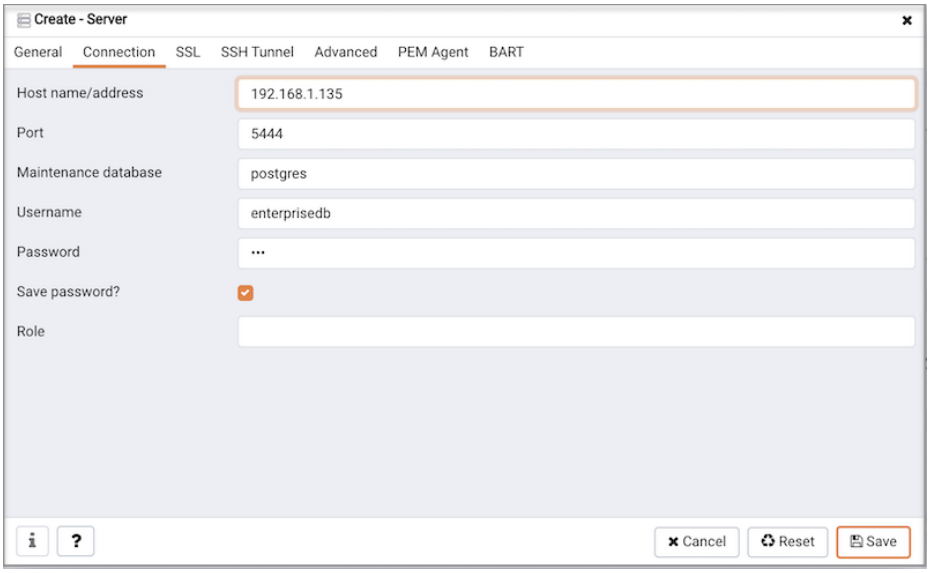


!!! Note You must ensure the `pg_hba.conf` file of the Postgres server that you are registering allows connections from the host of the PEM client before attempting to connect.



Use the fields on the `General` tab to describe the general properties of the server:

- Use the `Name` field to specify a user-friendly name for the server. The name specified will identify the server in the PEM `Browser` tree control.
- You can use groups to organize your servers and agents in the tree control. Using groups can help you manage large numbers of servers more easily. For example, you may want to have a production group, a test group, or LAN specific groups. Use the `Group` drop-down listbox to select the server group in which the new server will be displayed.
- Use the `Team` field to specify a Postgres role name. Only PEM users who are members of this role, who created the server initially, or have superuser privileges on the PEM server will see this server when they logon to PEM. If this field is left blank, all PEM users will see the server.
- Use the `Background` color selector to select the color that will be displayed in the PEM tree control behind database objects that are stored on the server.
- Use the `Foreground` color selector to select the font color of labels in the PEM tree control for objects stored on the server.
- Check the box next to `Connect now?` to instruct PEM to attempt a server connection when you click the Save button. Leave `Connect now?` unchecked if you do not want the PEM client to validate the specified connection parameters until a later connection attempt.
- Provide notes about the server in the `Comments` field.

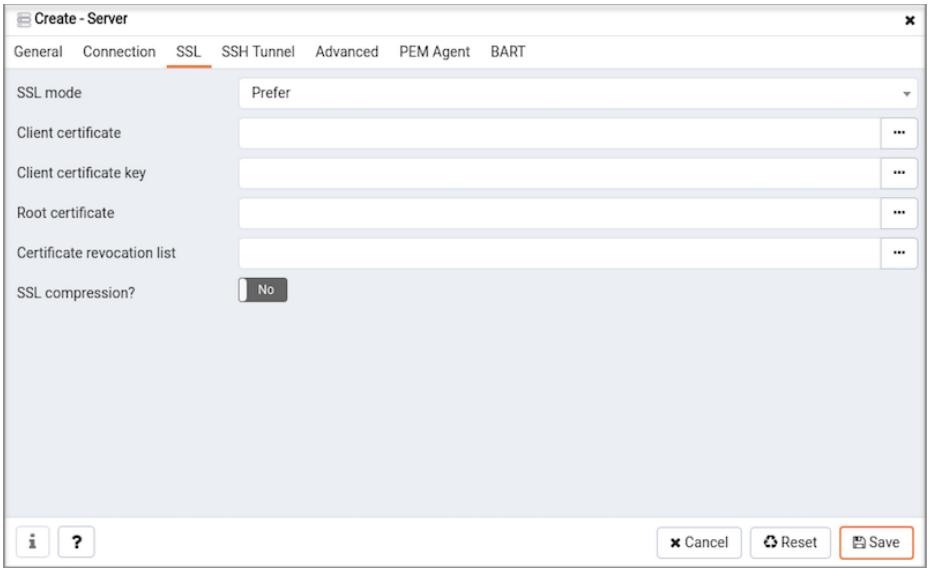


Use fields on the `Connection tab` to specify connection details for the server:

- Specify the IP address of the server host, or the fully qualified domain name in the `Host name/address` field. On Unix based systems, the address field may be left blank to use the default PostgreSQL Unix Domain Socket on the local machine, or may be set to an alternate path containing a PostgreSQL socket. If you enter a path, the path must begin with a "/".
- Specify the port number of the host in the `Port` field.
- Use the `Maintenance database` field to specify the name of the initial database that PEM will connect to, and that will be expected to contain `pgAgent` schema and `adminpack` objects installed (both optional). On PostgreSQL 8.1 and above, the maintenance DB is normally called `postgres`; on earlier versions `template1` is often used, though it is preferrable to create a `postgres` database to avoid cluttering the template database.
- Specify the name that will be used when authenticating with the server in the `Username` field.
- Provide the password associated with the specified user in the `Password` field.
- Check the box next to `Save password?` to instruct PEM to store passwords in encrypted format in PEM backend database for later reuse. Each password is stored on a per user, per server basis, and

won't be shared with other team members. PEM will use the saved password to connect the database server next time. To remove a saved password, disconnect the database server first, and then use the `Clear Saved Password` menu item from the `Object/Context` menu.

- Use the `Role` field to specify the name of the role that is assigned the privileges that the client should use after connecting to the server. This allows you to connect as one role, and then assume the permissions of another role when the connection is established (the one you specified in this field). The connecting role must be a member of the role specified.



Use the fields on the `SSL` tab to configure SSL:

- Use the drop-down list box in the `SSL mode` field to select the type of SSL connection the server should use. For more information about using SSL encryption, see the PostgreSQL documentation at:

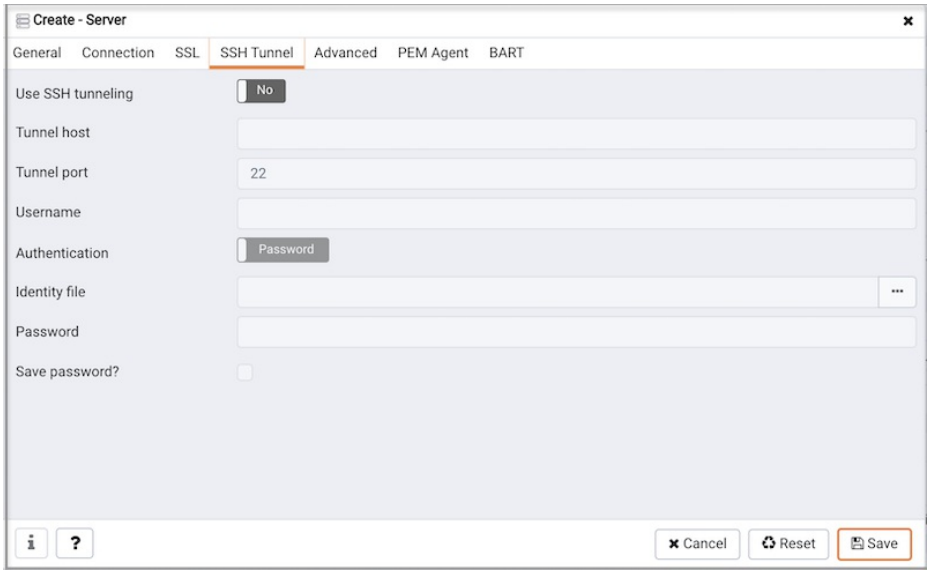
  https://www.postgresql.org/docs/current/static/libpq-ssl.html

You can use the platform-specific file manager dialog to upload files that support SSL encryption to the server. To access the file manager, click the icon that is located to the right of each of the following fields:

- Use the `Client certificate` field to specify the file containing the client SSL certificate. This file will replace the default `~/.postgresql/postgresql.crt` file if PEM is installed in Desktop mode, and `<STORAGE_DIR>/<USERNAME>/.postgresql/postgresql.crt` if PEM is installed in Web mode. This parameter is ignored if an SSL connection is not made.
- Use the `Client certificate` key field to specify the file containing the secret key used for the client certificate. This file will replace the default `~/.postgresql/postgresql.key` if PEM is installed in Desktop mode, and `<STORAGE_DIR>/<USERNAME>/.postgresql/postgresql.key` if PEM is installed in Web mode. This parameter is ignored if an SSL connection is not made.
- Use the `Root certificate` field to specify the file containing the SSL certificate authority. This file will replace the default `~/.postgresql/root.crt` file. This parameter is ignored if an SSL connection is not made.
- Use the `Certificate revocation list` field to specify the file containing the SSL certificate revocation list. This list will replace the default list, found in `~/.postgresql/root.crl`. This parameter is ignored if an SSL connection is not made.
- When `SSL compression?` is set to `True`, data sent over SSL connections will be compressed.

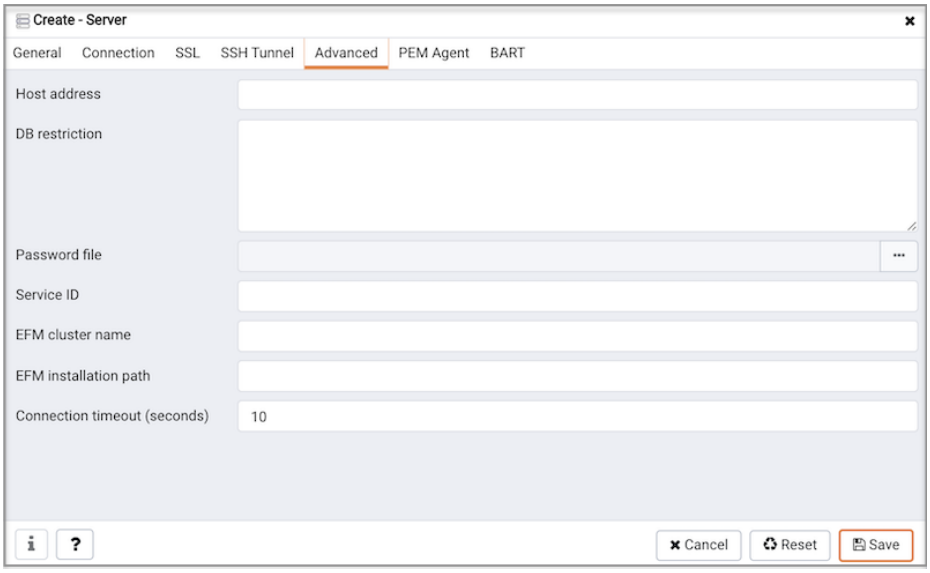
The default value is `False` (compression is disabled). This parameter is ignored if an SSL connection is not made.

Warning: Certificates, private keys, and the revocation list are stored in the per-user file storage area on the server, which is owned by the user account under which the PEM server process is run. This means that administrators of the server may be able to access those files; appropriate caution should be taken before choosing to use this feature.



Use the fields on the `SSH Tunnel` tab to configure SSH Tunneling. You can use a tunnel to connect a database server (through an intermediary proxy host) to a server that resides on a network to which the client may not be able to connect directly.

- Set `Use SSH tunneling` to `Yes` to specify that PEM should use an SSH tunnel when connecting to the specified server.
- Specify the name or IP address of the SSH host (through which client connections will be forwarded) in the `Tunnel host` field.
- Specify the port of the SSH host (through which client connections will be forwarded) in the `Tunnel port` field.
- Specify the name of a user with login privileges for the SSH host in the `Username` field.
- Specify the type of authentication that will be used when connecting to the SSH host in the `Authentication` field.
- Select `Password` to specify that PEM will use a password for authentication to the SSH host. This is the default.
- Select `Identity file` to specify that PEM will use a private key file when connecting.
- If the SSH host is expecting a private key file for authentication, use the `Identity file` field to specify the location of the key file.
- If the SSH host is expecting a password, use the `Password` field to specify the password, or if an identity file is being used, the passphrase.



Use fields on the `Advanced` tab to specify details that are used to manage the server:

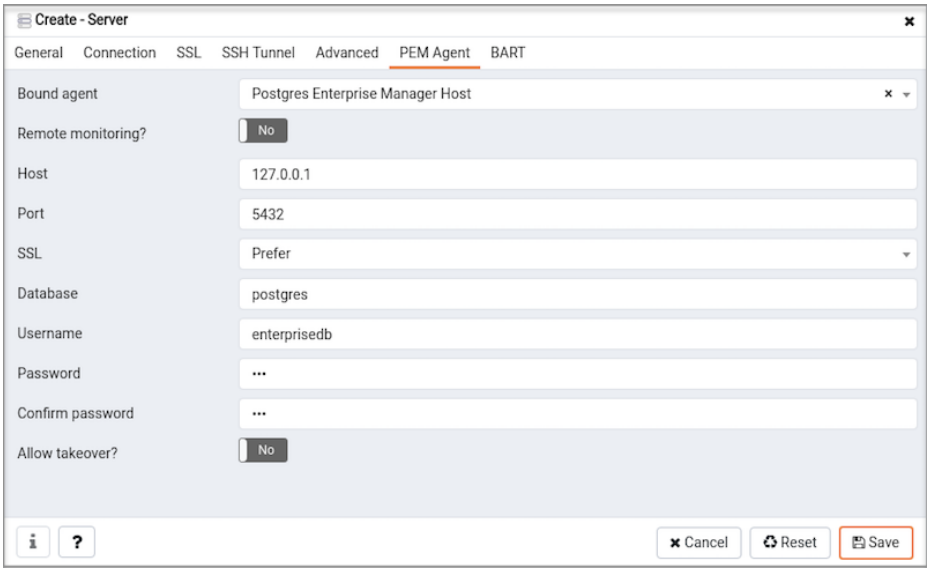
- Specify the IP address of the server host in the `Host Address1` field.
- Use the `DB restriction` field to specify a SQL restriction that will be used against the pg_database table to limit the databases displayed in the tree control. For example, you might enter: `'live_db'`, `'test_db'` to instruct the PEM browser to display only the `live_db` and `test_db` databases. Note that you can also limit the schemas shown in the database from the database properties dialog by entering a restriction against pg_namespace.
- Use the `Password file` field to specify the location of a password file (`.pgpass`). The `.pgpass` file allows a user to login without providing a password when they connect. It must be present on the PEM Server. For more information, see the Postgres documentation at:

  http://www.postgresql.org/docs/current/static/libpq-pgpass.html
- Use the `Service ID` field to specify parameters to control the database service process. For servers that are stored in the Enterprise Manager directory, enter the service ID. On Windows machines, this is the identifier for the Windows service. On Linux machines, the name of the init script used to start the server is `/etc/init.d` and the name of the systemd script to start the server is systemctl. For example, the name of the Advanced Server 11 service is `edb-as-11`. For local servers, the setting is operating system dependent:
  - If the PEM client is running on a Windows machine, it can control the postmaster service if you have sufficient access rights. Enter the name of the service. In case of a remote server, it must be prepended by the machine name (e.g. `PSE1\pgsql-8.0`). PEM will automatically discover services running on your local machine.
  - If the PEM client is running on a Linux machine, it can control processes running on the local machine if you have enough access rights. Provide a full path and needed options to access the `pg_ctl` program. When executing service control functions, PEM will append status/start/stop keywords to this. For example:

    `sudo /usr/pgsql-x/bin/pg_ctl -D /var/lib/pgsql/x/data` where `x` is the version of the PostgreSQL database server.

- If the server is a member of a Failover Manager cluster, you can use PEM to monitor the health of the cluster and to replace the primary node if necessary. To enable PEM to monitor Failover Manager, use the `EFM cluster name` field to specify the cluster name. The cluster name is the prefix of the name of the Failover Manager cluster properties file. For example, if the cluster properties file is named `efm.properties`, the cluster name is `efm`.

- If you are using PEM to monitor the status of a Failover Manager cluster, 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/edb/efm-x.x/bin`, where `x.x` specifies the Failover Manager version.



Use fields on the `PEM Agent` tab to specify connection details for the PEM agent:

- Select an Enterprise Manager agent using the drop-down listbox to the right of the `Bound agent` label. One agent can monitor multiple Postgres servers.

- Move the `Remote monitoring?` slider to `Yes` to indicate that the PEM agent does not reside on the same host as the monitored server. When remote monitoring is enabled, agent level statistics for the monitored server will not be available for custom charts and dashboards, and the remote server will not be accessible by some PEM utilities (such as Audit Manager, Capacity Manager, Log Manager, Postgres Expert and Tuning Wizard).

- Enter the IP address or socket path that the agent should use when connecting to the database server in the `Host` field. By default, the agent will use the host address shown on the `General` tab. On a Unix server, you may wish to specify a socket path, e.g. `/tmp`.

- Enter the `Port` number that the agent will use when connecting to the server. By default, the agent will use the port defined on the `Properties` tab.

- Use the drop-down listbox in the `SSL` field to specify an SSL operational mode; specify require, prefer, allow, disable, verify-ca or verify-full. For more information about using SSL encryption, see the PostgreSQL documentation.

- Use the `Database` field to specify the name of the database to which the agent will initially connect.

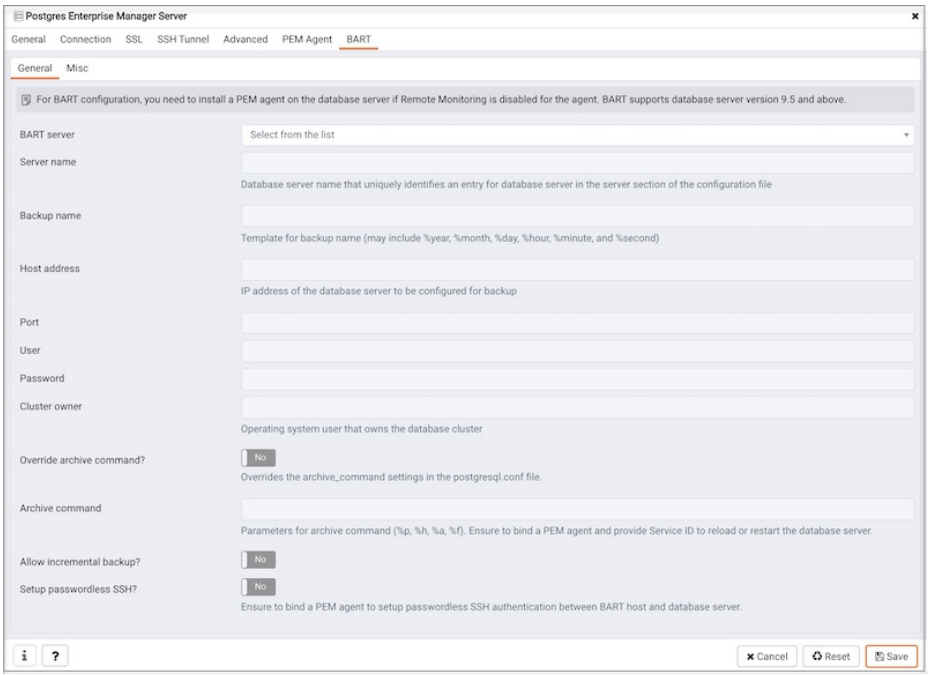
- Specify the name of the role that agent should use when connecting to the server in the `User name` field. Note that if the specified role is not a database superuser, then some of the features will not work as expected. For the list of features that do not work if the specified role is not a database superuser, see Agent privileges.

  If you are using Postgres version 10 or above, you can use the `pg_monitor` role to grant the required privileges to a non-superuser. For information about `pg_monitor` role, see Default Roles.

- Specify the name of the user that agent should use when connecting to the server in the `User name` field. Note that if the specified user is not a database superuser, then some of the features will not work as expected. If you are using Postgres version 10 or above, you can use the `pg_monitor` role to grant the required privileges to a non-superuser. For information about `pg_monitor` role, see Default Roles.

- Specify the password that the agent should use when connecting to the server in the `Password` field, and verify it by typing it again in the `Confirm password` field. If you do not specify a password, you will need to configure the authentication for the agent manually; for example, you can use a `.pgpass` file, and it must be present and accessible on the system, where agent is installed.

- Set the `Allow takeover?` slider to `Yes` to specify that the server may be taken over by another agent. This feature allows an agent to take responsibility for the monitoring of the database server if, for example, the server has been moved to another host as part of a high availability failover process.

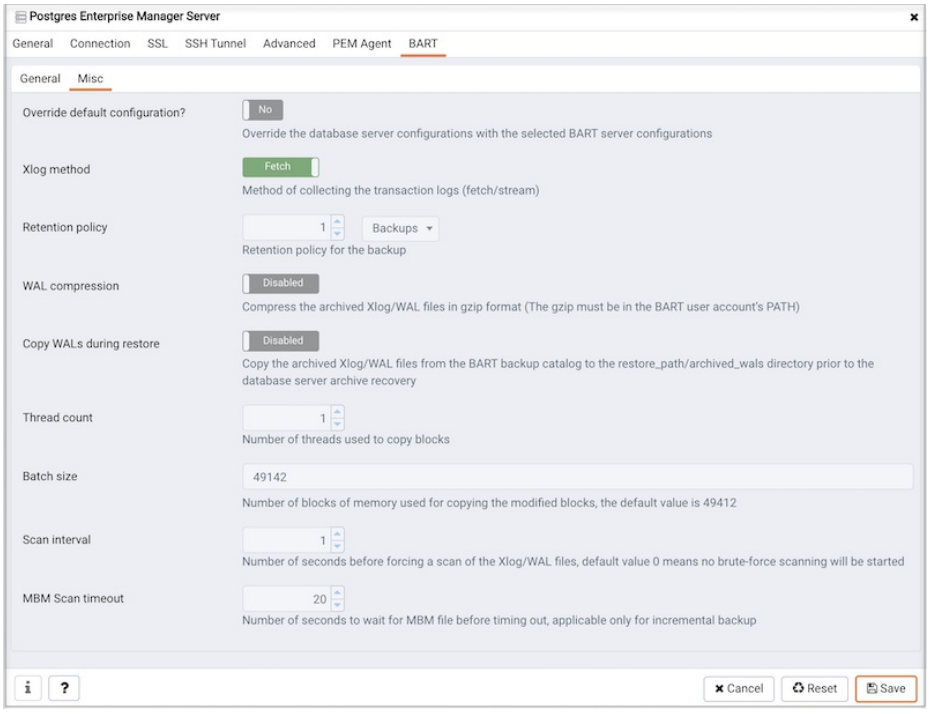


Use the fields on the `General` tab under `BART` tab to describe the general properties of the BART Server that will map to the PEM server:

- Use the `BART server` field to select the BART server name. All the BART servers configured in the PEM console will be listed in this drop down list.
- Use the `Server name` field to specify a name for the database server that you want to backup using the BART server. This name gets stored in the BART configuration file.
- Use the `Backup name` field to specify a template for user-defined names to be assigned to the

backups of the database server. If you do not specify a backup name template, then the backup can only be referenced in BART sub-commands by the BART-assigned integer backup identifier.

- Use the `Host address` field to specify the IP address of the database server that you want to configure for backup.
- Use the `Port` field to specify the port to be used for the database that you want to backup.
- Use the `User` field to specify the user of the database that you want to backup using BART through PEM console. If you want to enable incremental backups for this database server, then the user must be a superuser.
- Use the `Password` field to specify the password for the user of the database that you want to backup.
- Use the `Cluster Owner` field to specify the Linux operating system user account that owns the database cluster. This is typically `enterprisedb` for Advanced Server database clusters installed in the Oracle databases compatible mode, or `postgres` for PostgreSQL database clusters and for Advanced Server database clusters installed in the PostgreSQL databases compatible mode.
- Use the `Archive command` field to specify the desired format of the archive command string to be used in the `bart.cfg` file. Inputs provided for the Archive command will overwrite the database server's `Postgresql.conf` file. Once the server gets added, the database server will be restarted or database configurations will be reloaded.
- Use the `Allow incremental backup?` switch to specify if incremental backup should be enabled for this database server.
- Use the `Setup passwordless SSH?` switch to specify if you want to create SSH certificates to allow passwordess logins between the Database Server and the BART server. Ensure to bind a PEM agent before setting up the passwordless SSH authentication. Passwordless SSH will not work for a database server being remotely monitored by a PEM agent.



Use the fields on the `Misc` tab under `BART` tab to describe the miscellaneous properties of the BART Server:

- Use the `Override default configuration?` Switch to specify if you want to override the BART server configurations with the specific database server configurations.
- Use the `Xlog` method to specify how the transaction log should be collected during the execution of

`pg_basebackup`.

- Use the `Retention policy` field to specify the retention policy for the backup. This determines when an active backup should be marked as obsolete, and hence, be a candidate for deletion. You can specify the retention policy in terms of number of backup or in terms of duration (days, weeks, or months).
- Use the `WAL compression` switch to specify if you want to compress the archived Xlog/WAL files in Gzip format. To enable WAL compression, the gzip compression program must be present in the BART user account's PATH. The wal_compression setting must not be enabled for those database servers where you need to take incremental backups.
- Use the `Copy WALs during restore` field to specify how the archived WAL files are collected when invoking the RESTORE operation. Set to enabled to copy the archived WAL files from the BART backup catalog to the <restore_path>/archived_wals directory prior to the database server archive recovery. Set to disabled to retrieve the archived WAL files directly from the BART backup catalog during the database server archive recovery.
- Use the `Thread count` field to specify the number of threads to copy the blocks. You must set `thread count` to `1` if you want to take a backup with the `pg_basebackup` utility.
- Use the `Batch size` field to specify the number of blocks of memory used for copying modified blocks, applicable only for incremental backups.
- Use the `Scan interval` field to specify the number of seconds after which the WAL scanner should scan the new WAL files.
- Use the `MBM scan timeout` field to specify the number of seconds to wait for MBM files before timing out, applicable only for incremental backups.

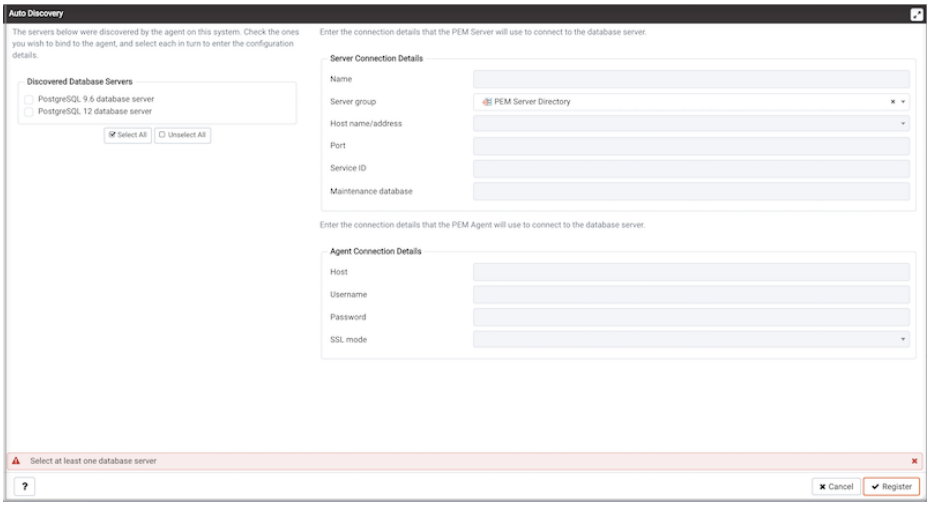
To view the properties of a server, right-click on the server name in the PEM client tree control, and select the `Properties…` option from the context menu. To modify a server's properties, disconnect from the server before opening the `Properties` dialog.

Automatic Server Discovery

If the server you wish to monitor resides on the same host as the monitoring agent, you can use the `Auto Discovery` dialog to simplify the registration and binding process.

To enable auto discovery for a specific agent, you must enable the `Server Auto Discovery` probe. To access the `Manage Probes` tab, highlight the name of a PEM agent in the PEM client tree control, and select `Manage Probes...` from the `Management` menu. When the `Manage Probes` tab opens, confirm that the slider control in the `Enabled?` column is set to `Yes`.

To open the `Auto Discovery` dialog, highlight the name of a PEM agent in the PEM client tree control, and select `Auto Discovery...` from the `Management` menu.



When the `Auto Discovery` dialog opens, the `Discovered Database Servers` box will display a list of servers that are currently not being monitored by a PEM agent. Check the box next to a server name to display information about the server in the `Server Connection Details` box, and connection properties for the agent in the `Agent Connection Details` box.

Use the `Check All` button to select the box next to all of the displayed servers, or `Uncheck All` to deselect all of the boxes to the left of the server names.

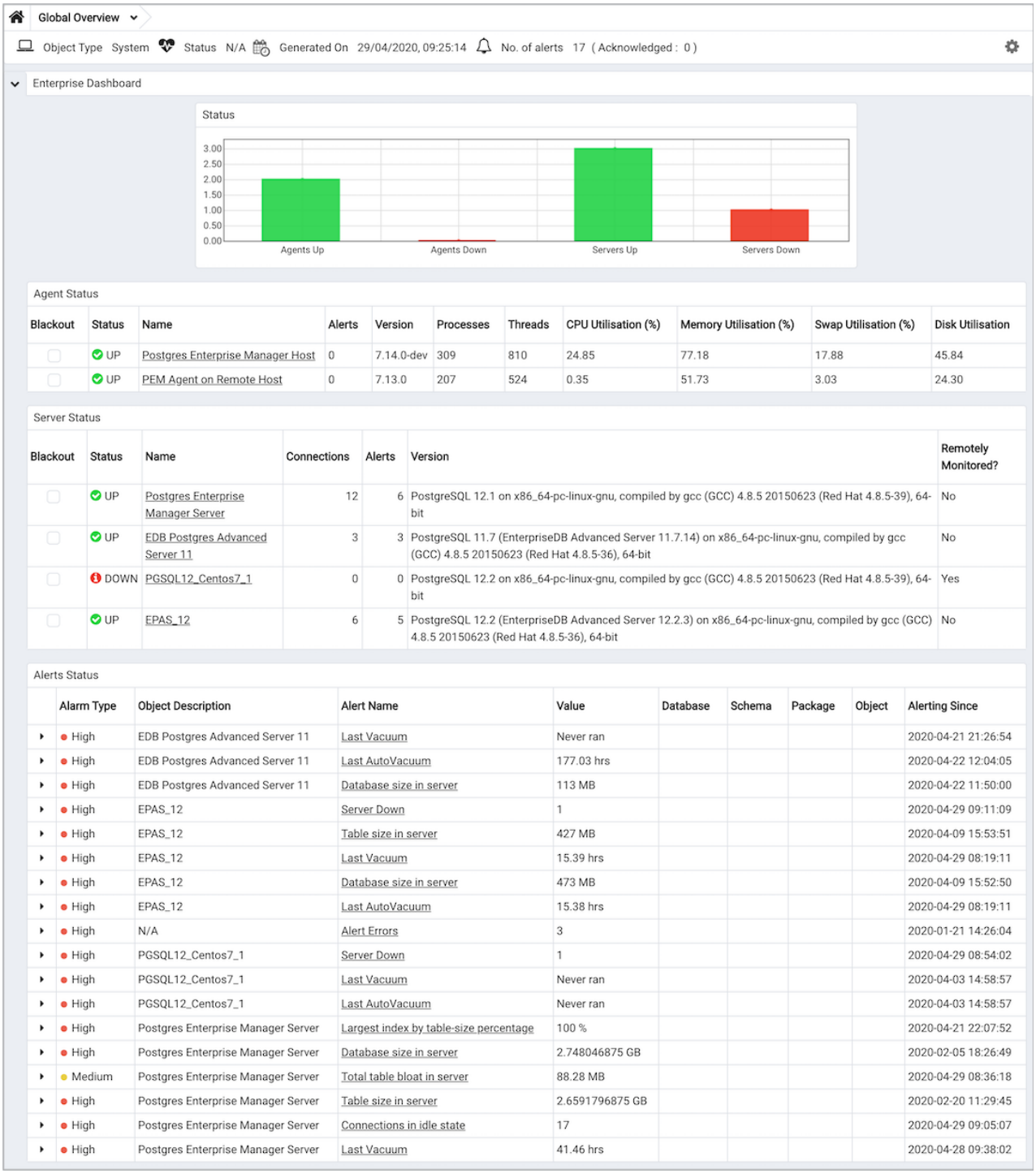
The fields in the `Server Connection Details` box provide information about the server that PEM will monitor:

- Accept or modify the name of the monitored server in the `Name` field. The specified name will be displayed in the tree control of the PEM client.
- Use the `Server group` drop-down listbox to select the server group under which the server will be displayed in the PEM client tree control.
- Use the `Host name/address` field to specify the IP address of the monitored server.
- The `Port` field displays the port that is monitored by the server; this field may not be modified.
- Provide the name of the service in the `Service ID` field. Please note that the service name must be provided to enable some PEM functionality.
- By default, the `Maintenance database` field indicates that the selected server uses a Postgres maintenance database. Customize the content of the `Maintenance database` field for your installation.

The fields in the `Agent Connection Details` box specify the properties that the PEM agent will use when connecting to the server:

- The `Host` field displays the IP address that will be used for the PEM agent binding.
- The `User name` field displays the name that will be used by the PEM agent when connecting to the selected server.
- The `Password` field displays the password associated with the specified user name.
- Use the drop-down listbox in the `SSL mode` field to specify your SSL connection preferences.

When you've finished specifying the connection properties for the servers that you are binding for monitoring, click the `OK` button to register the servers. Click `Cancel` to exit without preserving any changes.



After clicking the `OK` button, the newly registered server is displayed in the PEM tree control and is monitored by the PEM server.

Using the pemworker Utility to Register a Server

You can use the `pemworker` utility to register a server for monitoring by the PEM server or to unregister a database server. During registration, the `pemworker` utility will bind the new server to the agent that resides on the system from which you invoked the registration command. To register a server:

On a Linux host, use the command:

```
pemworker --register-server
```

On a Windows host, use the command:

```
pemworker.exe REGISTER-SERVICE
```

Append command line options to the command string when invoking the `pemworker` utility. Each option should be followed by a corresponding value:

Option	Description
`--pem-user`	Specifies the name of the PEM administrative user. Required.
`--server-addr`	Specifies the IP address of the server host, or the fully qualified domain name. On Unix based systems, the address field may be left blank to use the default PostgreSQL Unix Domain Socket on the local machine, or may be set to an alternate path containing a PostgreSQL socket. If you enter a path, the path must begin with a /. Required.
`--server-port`	Specifies the port number of the host. Required.
`--server-database`	Specifies the name of the database to which the server will connect. Required.
`--server-user`	Specify the name of the user that will be used by the agent when monitoring the server. Required.
`--server-service-name`	Specifies the name of the database service that controls operations on the server that is being registered (STOP, START, RESTART, etc.). Optional.
`--remote-monitoring`	Include the --remote-monitoring clause and a value of no (the default) to indicate that the server is installed on the same machine as the PEM agent. When remote monitoring is enabled (yes), agent level statistics for the monitored server will not be available for custom charts and dashboards, and the remote server will not be accessible by some PEM utilities (such as Audit Manager, Capacity Manager, Log Manager, Postgres Expert and Tuning Wizard). Required.
`--efm-cluster-name`	Specifies the name of the Failover Manager cluster that monitors the server (if applicable). Optional.
`--efm-install-path`	Specifies the complete path to the installation directory of Failover Manager (if applicable). Optional.
`--asb-host-name`	Specifies the name of the host to which the agent is connecting.
`--asb-host-port`	Specifies the port number that the agent will use when connecting to the database.
`--asb-host-db`	Specifies the name of the database to which the agent will connect.

Option	Description
`--asb-host-user`	Specifies the database user name that the agent will supply when authenticating with the database.
`--asb-ssl-mode`	Specifies the type of SSL authentication that will be used for connections. Supported values include: prefer, require, disable, verify-CA, verify-full.
`--group`	Specifies the name of the group in which the server will be displayed.
`--team`	Specifies the name of the group role that will be allowed to access the server.
`--owner`	Specifies the name of the role that will own the monitored server.

Set the environment variable `PEM_SERVER_PASSWORD` to provide the password for the PEM server to allow the pemworker to connect as a PEM admin user.

Set the environment variable `PEM_MONITORED_SERVER_PASSWORD` to provide the password of the database server being registered and monitored by pemagent.

Failure to provide the password will result in a password authentication error. The PEM server will acknowledge that the server has been registered properly.

Using the pemworker Utility to Unregister a Server

You can use the `pemworker` utility to unregister a database server; to unregister a server, invoke the `pemworker` utility:

On a Linux host, use the command:

```
pemworker --unregister-server
```

On a Windows host, use the command:

```
pemworker.exe UNREGISTER-SERVICE
```

Append command line options to the command string when invoking the `pemworker` utility. Each option should be followed by a corresponding value:

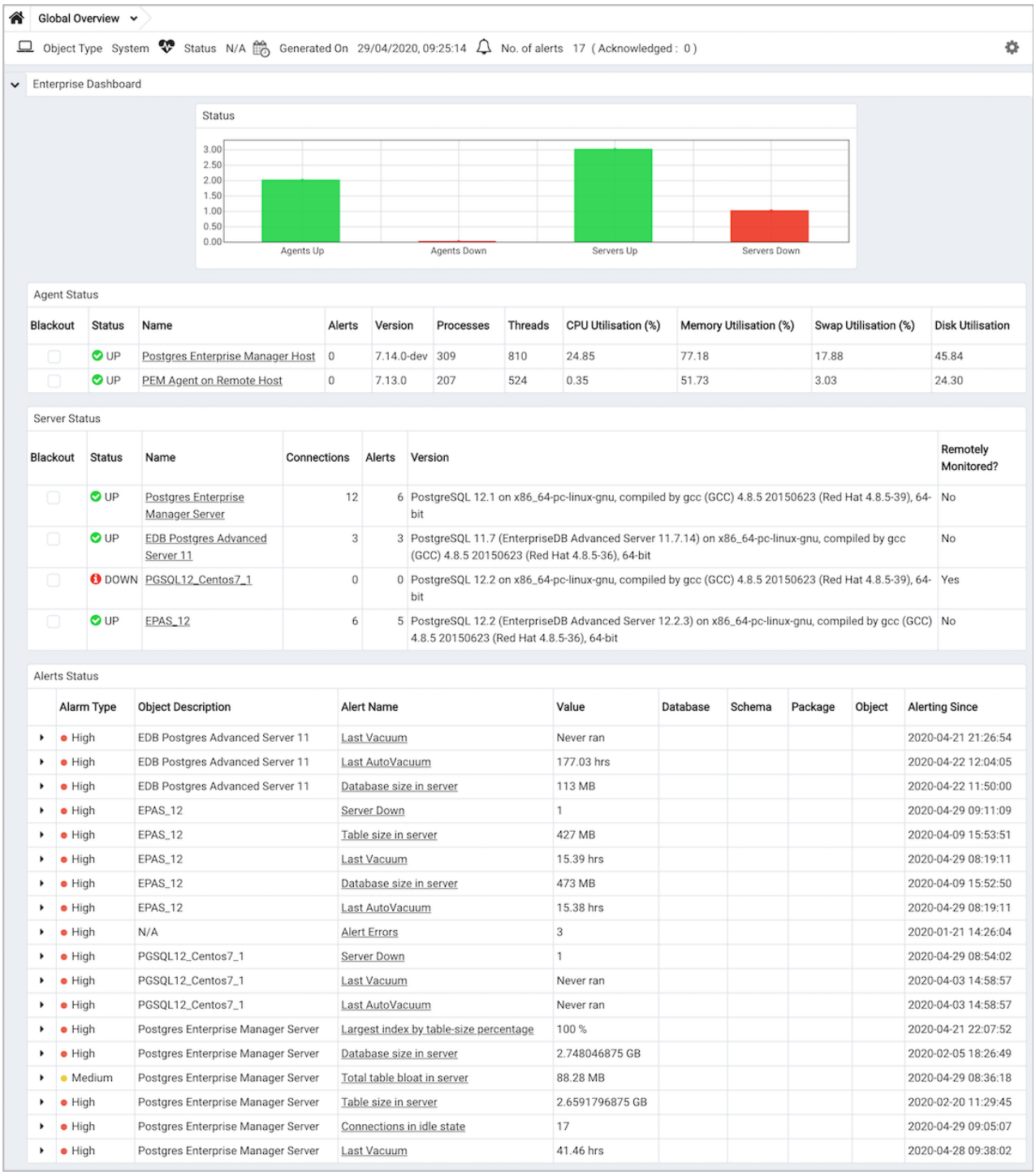
Option	Description
`--pem-user`	Specifies the name of the PEM administrative user. Required.
`--server-addr`	Specifies the IP address of the server host, or the fully qualified domain name. On Unix based systems, the address field may be left blank to use the default PostgreSQL Unix Domain Socket on the local machine, or may be set to an alternate path containing a PostgreSQL socket. If you enter a path, the path must begin with a /. Required.
`--server-port`	Specifies the port number of the host. Required.

Use the `PEM_SERVER_PASSWORD` environment variable to provide the password for the PEM server to allow the pemworker to connect as a PEM admin user.

Failure to provide the password will result in a password authentication error. The PEM server will acknowledge that the server has been unregistered.

Verifying the Connection and Binding

Once registered, the new server will be added to the PEM `Browser` tree control, and be displayed on the `Global Overview`.



When initially connecting to a newly bound server, the `Global Overview` dashboard may display the new server with a status of “unknown” in the server list; before recognizing the server, the bound agent must execute a number of probes to examine the server, which may take a few minutes to complete depending on network availability.

Within a few minutes, bar graphs on the `Global Overview` dashboard should show that the agent has now connected successfully, and the new server is included in the `Postgres Server Status` list.

If after five minutes, the `Global Overview` dashboard still does not list the new server, you should review the logfiles for the monitoring agent, checking for errors. Right-click the agent's name in the tree control, and select the `Probe Log Analysis` option from the `Dashboards` sub-menu of the context menu.

3 Defining and Monitoring Postgres instances on AWS

There are two scenarios in which you can monitor a Postgres instance on an AWS host with PEM. You can monitor a:

- Postgres Instance running on AWS EC2
- Postgres Instance running on AWS RDS

Monitoring a Postgres Instance Running on AWS EC2

After creating a Postgres instance on AWS EC2, you can use the PEM server to register and monitor your instance. The following scenarios are currently supported:

- Postgres instance and PEM Agent running on the same AWS EC2 and a PEM Server running on your local machine.
- Postgres instance and PEM Agent running on the same local machine and a PEM Server running on AWS EC2.
- Postgres instance and PEM Agent running on the same AWS EC2 and a PEM Server running in different AWS EC2.

!!! Note In the first two scenarios, you must configure the VPN on AWS EC2 , so the AWS EC2 instance can access the `pem` database. Please contact your network administrator to setup the VPN if needed.

The PEM Agent running on AWS EC2 or on your local machine should be registered to the PEM Server. Please note that when registering the PEM Agent with the PEM Server you should use the hostname of AWS EC2 instance. For more details on registering the PEM Agent see, PEM Self Registration.

You can register the Postgres instance running on AWS EC2 on PEM Server using the `Create - Server` dialog. For more details on registering the server using `Create - Server` dialog see,

Registering a Server. Use the `PEM Agent` tab on the `Create - Server` dialog to bind the registered PEM Agent with the Postgres instance.

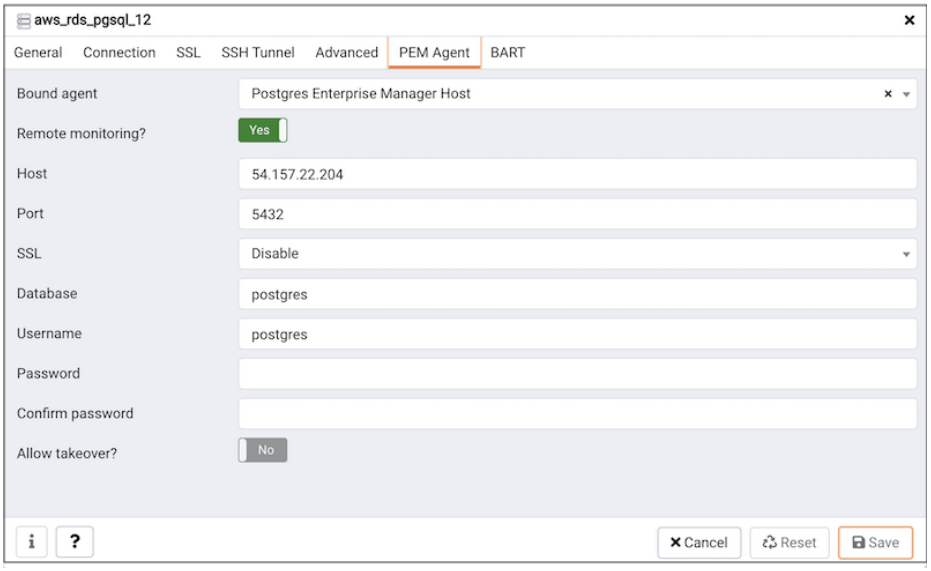
When the PEM Agent is registered to the PEM Server and your Postgres instance that is running on AWS EC2 is registered to the PEM Server, you can monitor your instance with PEM.

Monitoring a Postgres Instance Running on AWS RDS

While creating an AWS RDS database, choose `PostgreSQL` when prompted for `Engine options`. After creating a `Postgres(RDS)` instance on AWS, use `Create - Server` dialog to add the `Postgres(RDS)` instance to the PEM Server. Using this dialog you can describe a new server connection, bind the server to a PEM Agent, and display the server to the PEM browser tree control.

For detailed information on the `Create - Server` dialog and configuration details for each tab, see Registering a Server.

The `PEM Agent` tab in the `Create - Server` dialog must have the `Remote Monitoring` field set to `Yes` to monitor the `Postgres(RDS)` instance on AWS instance using PEM Server.



As the PEM Agent will be monitoring the Postgres(RDS) AWS instance remotely, the functionality will be limited as described below:

Feature Name	Works with remote PEM Agent	Comments
Audit Manager	No	
Capacity Manager	Limited	There will be no correlation between the database server and operating system metrices.
Log Manager	No	

Feature Name	Works with remote PEM Agent	Comments
Manage Alerts	Limited	When you run an alert script on the database server, it will run on the machine where the bound PEM Agent is running, and not on the actual database server machine.
Manage Charts	Yes	
Manage Dashboards	Limited	Some dashboards may not be able to show complete data. For example, the operating system information of the database server will not be displayed as it is not available.
Manage Probes	Limited	Some of the PEM probes will not return information, and some of the functionalities may be affected. For details about probe functionality, see the PEM Agent Guide.
Postgres Expert	Limited	The Postgres Expert will provide partial information as operating system information is not available.
Postgres Log Analysis Expert	No	The Postgres Log Analysis Expert will not be able to perform an analysis as it is dependent on the logs imported by log manager, which will not work as required.
Scheduled Tasks	Limited	Scheduled tasks will work only for database server; scripts will run on a remote Agent.
Tuning Wizard	No	
System Reports	Yes	
Core Usage Reports	Limited	The Core Usage report will not show complete information. For example, the platform, number of cores, and total RAM will not be displayed.
Managing BART	No	BART requires password less authentication between two machines, where database server and BART are installed. An AWS RDS instance doesn't allow to use host access.

4 Managing Certificates

Files stored in the data directory of the PEM server backing database contain information that helps the PEM server utilize secure connections:

- `ca_certificate.crt`
- `ca_key.key`
- `server.crt`
- `server.key`
- `root.crl`

- `root.crt`

The PEM agent that is installed with the PEM server monitors the expiration date of the `ca_certificate.crt` file. When the certificate is about to expire, PEM will:

- Make a backup of the existing certificate files.
- Create new certificate files, appending the new CA certificate file to the root.crt file on the PEM server.
- Create a job that renews the certificate file of any active agents.
- Restart the PEM server.

When you uninstall an agent, the certificate associated with that agent will be added to the certificate revocation list (maintained in the `root.crl` file) to ensure that the certificate cannot be used to connect to the PEM server.

The following sections contain detailed information about manually replacing certificate files.

Replacing SSL Certificates

The following steps detail replacing the SSL certificates on an existing PEM installation. If you plan to upgrade your server to a new version at the same time, invoke all of the PEM installers (first the server installer, then agent installers) before replacing the SSL certificates. Then:

1. Stop all running PEM agents, first on the server host, and then on any monitored node.

   To stop a PEM agent on a Linux host, open a terminal window, assume superuser privileges, and enter the command:

   On Linux with systemd, for eg: Centos 7 or 8

   ```
   systemctl stop pemagent
   ```

   On a Windows host, you can use the `Services` applet to stop the PEM agent. The PEM agent service is named Postgres Enterprise Manager Agent; highlight the service name in the `Services` dialog, and click `Stop the service`.

2. Take a backup of the existing SSL keys and certificates. The SSL keys and certificates are stored in the `data` directory under your PEM installation. For example, the default location on a Linux system is:

   `/var/lib/pgsql/x/data` where `x` is the PostgreSQL database version.

   Make a copy of the following files, adding an extension to each file to make the name unique:

   - `ca_certificate.crt`
   - `ca_key.key`
   - `root.crt`
   - `root.crl`

- `server.key`
- `server.crt`

For example, the command:

```
# cp ca_certificate.crt ca_certificate_old.crt
```

Creates a backup of the `ca_certificate` file with the word `old` appended to the entry.

3. Use the `openssl_rsa_generate_key()` function to generate the `ca_key.key` file:

```
/usr/pgsql-x.x/bin/psql -U postgres -d pem --no-psqlrc -t -A -c
"SELECT public.openssl_rsa_generate_key(1024)" >
/var/lib/pgsql/x/data/ca_key.key
```

After creating the `ca_key.key` file, `cat` the contents to the variable `CA_KEY` for use when generating the `ca_certificate.crt` file and modify the privileges on the `ca_key.key` file:

```
CA_KEY=$(cat /var/lib/pgsql/x/data/ca_key.key)

chmod 600 /var/lib/pgsql/x/data/ca_key.key
```

4. Use the key to generate the `ca_certificate.crt` file. For simplicity, place the SQL query into a temporary file with a unique name:

```
echo "SELECT openssl_csr_to_crt(openssl_rsa_key_to_csr('${CA_KEY}',
'PEM','US', 'MA', 'Bedford', 'Postgres Enterprise Manager',
'support@enterprisedb.com'), NULL,
'/var/lib/pgsql/x/data/ca_key.key')" > /tmp/_random.$$
```

Then use the variable to execute the query, placing the content into the `ca_certificate.crt` file.

```
/usr/pgsql-x/bin/psql -U postgres -d pem --no-psqlrc -t -A -f
/tmp/_random.$$ > /var/lib/pgsql/x/data/ca_certificate.crt
```

Modify the permissions of the `ca_certificate.crt` file, and remove the temporary file that contained the SQL command:

```
chmod 600 /var/lib/pgsql/x/data/ca_certificate.crt

rm -f /tmp/_random.$$
```

5. Re-use the `ca_certificate.crt` file as the `root.crt` file:

```
cp /var/lib/pgsql/x/data/ca_certificate.crt
/var/lib/pgsql/x/data/root.crt
```

Modify the permissions of the `root.crt` file:

```
chmod 600 /var/lib/pgsql/x/data/root.crt
```

6. Use the `openssl_rsa_generate_crl()` function to create the certificate revocation list (`root.crl`):

```
/usr/pgsql-x/bin/psql -U postgres -d pem --no-psqlrc -t -A -c
 "SELECT
openssl_rsa_generate_crl('/var/lib/pgsql/x/data/ca_certificate.crt',
'/var/lib/pgsql/x/data/ca_key.key')" > /var/lib/pgsql/x/data/root.crl
```

   Modify the permissions of the `root.crl` file:

```
chmod 600 /var/lib/pgsql/x/data/root.crl
```

7. Use the `openssl_rsa_generate_key()` function to generate the `server.key` file:

```
/usr/pgsql-x/bin/psql -U postgres -d pem --no-psqlrc -t -A -c "SELECT
public.openssl_rsa_generate_key(1024)" >>
/var/lib/pgsql/x/data/server.key
```

   After creating the `server.key` file, `cat` the contents to the variable `SSL_KEY` for use when generating the `server.crt` file and modify the privileges on the `server.key` file:

```
SSL_KEY=$(cat /var/lib/pgsql/x/data/server.key)

chmod 600 /var/lib/pgsql/x/data/server.key
```

8. Use the `SSL_KEY` to generate the server certificate. Save the certificate in the `server.crt` file. For simplicity, first place the SQL query into a temporary file with a unique name:

```
echo "SELECT openssl_csr_to_crt(openssl_rsa_key_to_csr('${SSL_KEY}',
'PEM','US', 'MA', 'Bedford', 'Postgres Enterprise Manager',
'support@enterprisedb.com'),
'/var/lib/pgsql/x/data/ca_certificate.crt',
'/var/lib/pgsql/x/data/ca_key.key')" > /tmp/_random.$$

 /usr/pgsql-x/bin/psql -U postgres -d pem --no-psqlrc -t -A -f
/tmp/_random.$$ >> /var/lib/pgsql/x/data/server.crt
```

9. Modify the privileges on the `server.crt` file, and delete the temporary file:

```
chmod 600 /var/lib/pgsql/x/data/server.crt

rm -f /tmp/_random.$$
```

10. Restart the Postgres server:

    On Linux with `init.d`; for example, on a Centos6 host:

```
/etc/init.d/postgresql-x restart
```

On Linux with `systemd`; for example, on a Centos7 host:

```
systemctl restart postgresql-x
```

Updating Agent SSL Certificates

For each agent that interacts with the PEM server, you must:

- generate an rsa key and a certificate.
- copy the key and certificate to the agent.
- restart the agent.

Each agent has a unique identifier that is stored in the `pem.agent` table in the `pem` database. You must replace the key and certificate files with the key or certificate that corresponds to the agent's identifier. Please note that you must move the `agent.key` and `agent.crt` files (generated in Steps 2 and 3 into place on their respective PEM agent host before generating the next key file pair; subsequent commands will overwrite the previously generated file.

To generate a PEM agent key file pair:

1. Use psql to find the number of agents and their corresponding identifiers:

```
/usr/pgsql-x/bin/psql -U postgres -d pem --no-psqlrc -t -A -c "SELECT
ID FROM pem.agent"
```

- On Linux, you can also find the agent identifier and location of the keys and certificates in the `PEMagent` section of the `/etc/postgres-reg.ini` file.
- On Windows, the information is stored in the registry:
  - On a 64-bit Windows installation, check:

```
HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\EnterpriseDB\PEM\agent
```

  - On a 32-bit Windows installation, check:

```
HKEY_LOCAL_MACHINE\SOFTWARE\EnterpriseDB\PEM\agent
```

2. After identifying the agents that will need key files, generate an `agent.key` for each agent. To generate the key, execute the following command, capturing the output in a file:

```
/usr/pgsql-x/bin/psql -U postgres -d pem --no-psqlrc -t -A -c "SELECT
openssl_rsa_generate_key(1024)" > agent.key
```

Modify the privileges of the `agent.key` file:

```
chmod 600 agent.key
```

3. Generate a certificate for each agent. To generate a certificate, execute the following command, capturing the output in a certificate file:

```
/usr/pgsql-x/bin/psql -U postgres -d pem --no-psqlrc -t -A -c
"SELECT openssl_csr_to_crt(openssl_rsa_key_to_csr('$(cat agent.key)',
'agent<$ID>', 'US', 'MA', 'Bedford', 'Postgres Enterprise Manager',
'support@enterprisedb.com'),
'/var/lib/pgsql/x/data/ca_certificate.crt',
'/var/lib/pgsql/x/data/ca_key.key')" > agent.crt
```

   Where *$ID* is the agent number of the agent (retrieved via the psql command line).

4. Modify the privileges of the `agent.crt` file:

```
chmod 600 agent.crt
```

5. Replace each agent's key and certificate file with the newly generated files before restarting the PEM agent service:

   On Linux with `init.d`, restart the service with the command:

```
/etc/init.d/pemagent start
```

   On Linux with `systemd`, restart the service with the command:

```
systemctl start pemagent
```

   On a Windows host, you can use the Services applet to start the PEM agent. The PEM agent service is named `Postgres Enterprise Manager Agent`; highlight the service name in the `Services` dialog, and click `Start the service`.

5 Managing Configuration Settings

Multiple configuration files are read at startup by Postgres Enterprise Manager. The files are as follows:

- `config.py`: This is the main configuration file, and should not be modified. It can be used as a reference for configuration settings, that may be overridden in one of the following files.
- `config_distro.py`: This file is read after `config.py` and is intended for packagers to change any settings that are required for their Postgres Enterprise Manager distribution. This may typically include certain paths and file locations. This file is optional, and may be created by packagers in the same directory as `config.py` if needed.
- `config_local.py`: This file is read after `config_distro.py` and is intended for end users to

change any default or packaging specific settings that they may wish to adjust to meet local preferences or standards.This file is optional, and may be created by users in the same directory as `config.py` if needed.

A copy of the default `config.py` file is included in the PEM online help for reference.

6 Managing a PEM Server

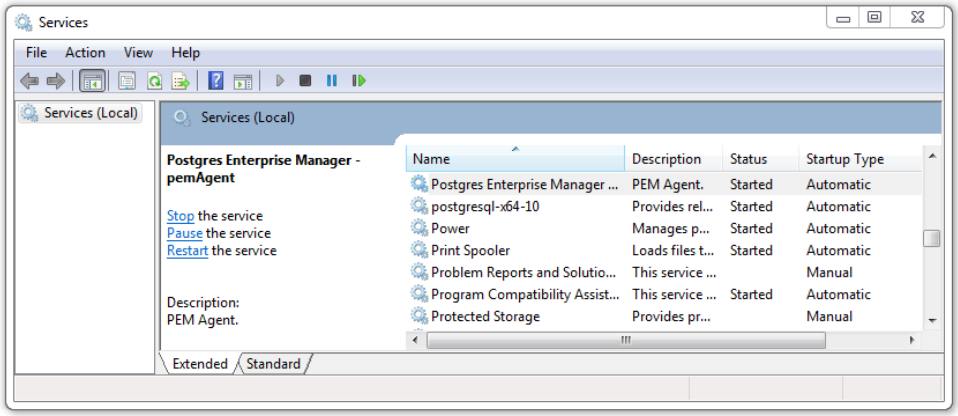
The sections that follow provide information about tasks related to PEM server such as restarting the PEM server and agent, controlling the PEM server or PEM agent, controlling the HTTPD service on Linux and Windows, controlling the HTTPD server, managing PEM authentication and security, modifying the `pg_hba.conf` file, modifying PEM to use a proxy server etc.

Starting and Stopping the PEM Server and Agents

The PEM server starts, stops and restarts when the Postgres server instance on which it resides starts, stops or restarts; use the same commands to control the PEM server that you would use to control the Postgres server. On Linux platforms, the command that stops and starts the service script will vary by platform and OS version.

The PEM agent is controlled by a service named `pemagent`.

The Windows operating system includes a graphical service controller that displays the server status, and offers point-and-click server control. The `Services` utility can be accessed through the Windows `Control Panel`. When the utility opens, use the scroll bar to navigate through the listed services to highlight the service name.



Use the `Stop`, `Pause`, `Start`, or `Restart` buttons to control the state of the service.

Please note that any user (or client application) connected to the Postgres server will be abruptly disconnected if you stop the service. For more information about controlling a service, please consult

the EDB Postgres Advanced Server Installation Guide, available from the EDB website.

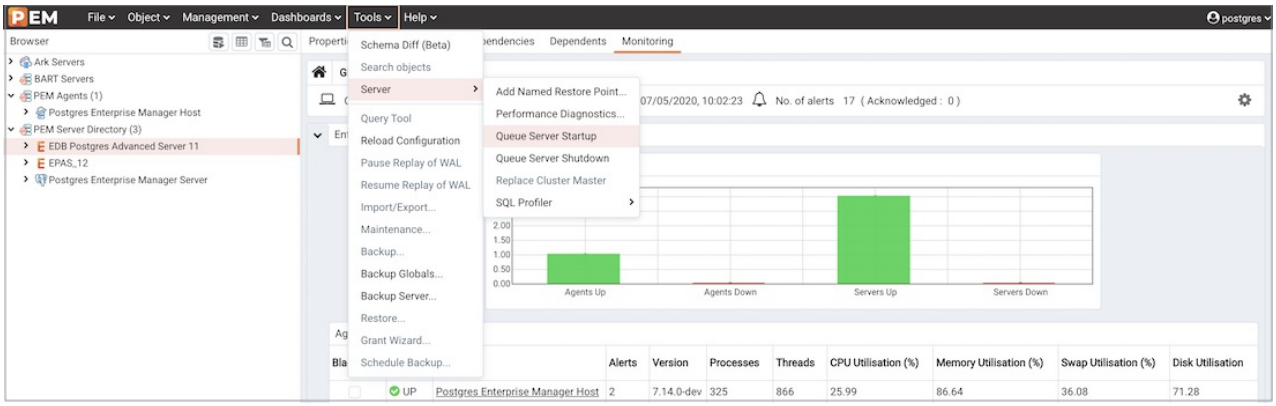
Remotely Starting and Stopping Monitored Servers

PEM allows you to startup and shutdown managed server instances with the PEM client. To configure a server to allow PEM to manage the service, complete the Server registration dialog, registering the database server with a PEM agent and:

- specify the `Store on PEM Server` option on the `Properties` dialog.
- specify the name of a service script in the `Service ID` field on the `Advanced` tab:
  - For Advanced Server, the service name is `edb-as-<x>` or `ppas-<x>`.
  - For PostgreSQL, the service name is `postgresql-<x>`.

  Where `x` indicates the server version number.

After connecting to the server, you can start or stop the server by highlighting the server name in the tree control, and selecting `Queue Server Startup` or `Queue Server Shutdown` from the `Tools` menu.



Controlling the PEM Server or PEM Agent on Linux

On Linux platforms, the name of the service script that controls:

- a PEM server on Advanced Server is `edb-as-<x>` or `ppas-<x>`
- a PEM server on PostgreSQL is `postgresql-<x>`
- a PEM agent is `pemagent`

Where `x` indicates the server version number.

You can use the service script to control the service.

- To control a service on RHEL or CentOS version 7.x or 8.x open a command line, assume superuser privileges, and issue the command:

```
systemctl <service_name> <action>
```

Where:

`service_name` is the name of the service.

`action` specifies the action taken by the service. Specify:

- `start` to start the service.
- `stop` to stop the service.
- `restart` to stop and then start the service.
- `status` to check the status of the service.

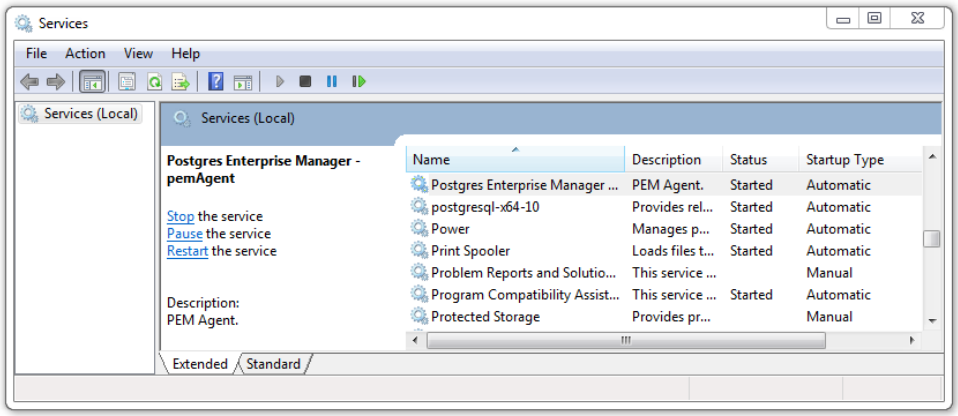
Controlling the PEM Server or PEM Agent on Windows

The Windows operating system includes a graphical service controller that displays the server status, and offers point-and-click server control. The registered name of the service that controls:

- a PEM server host on PostgreSQL is `postgresql-<x>`
- a PEM server host on Advanced Server is `edb-as-<x>`, or `ppas-<x>`
- a PEM agent is `Postgres Enterprise Manager - pemAgent`

Where `x` indicates the server version number.

Navigate through the Windows `Control Panel` to open the `Services` utility. When the utility opens, use the scroll bar to browse the list of services.



Use the `Stop the service` option to stop a service. Any user (or client application) connected to the server will be abruptly disconnected if you stop the service.

Use the `Pause the service` option to instruct Postgres to reload a service's configuration parameters. The `Pause the service` option is an effective way to reset parameters without disrupting user sessions for many of the configuration parameters.

Use the `Start the service` option to start a service.

Controlling the HTTPD Server

On Linux, you can confirm the status of the `PEM-HTTPD` service by opening a command line, and entering the following command:

```
ps -ef | grep httpd
```

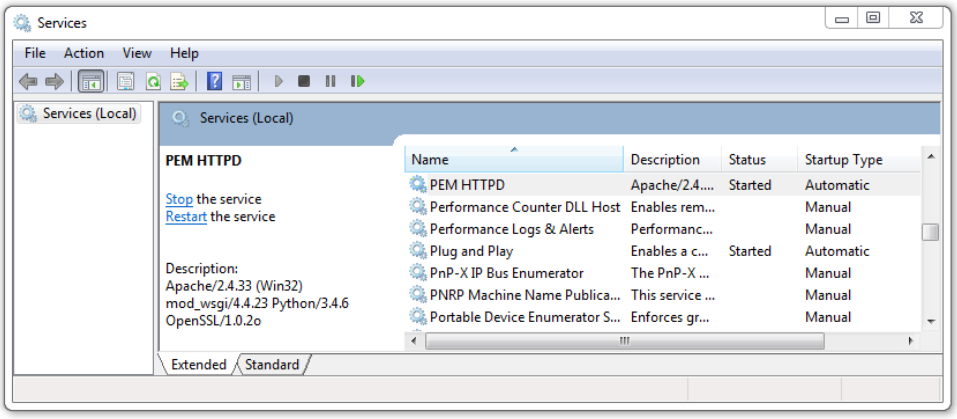
If Linux responds with an answer that is similar to the following example, `httpd` is not running:

```
user 13321 13267 0 07:37 pts/1 00:00:00 grep httpd
```

To start the service on a CentOS or RHEL 7.x or 8.x system, use the command:

```
systemctl start httpd
```

On Windows, you can use the `Services` applet to check the status of the `PEM HTTPD` service. After opening the Services applet, scroll through the list to locate the `PEM HTTPD` service.

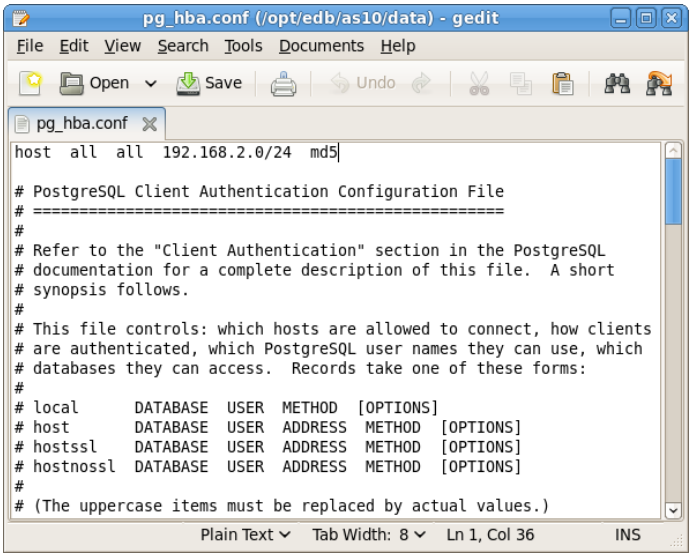


The `Status` column displays the current state of the server. Click the `Start` link to start `PEM HTTPD` if the service is not running.

Modifying the pg_hba.conf File

Entries in the `pg_hba.conf` file control network authentication and authorization. The `pg_hba.conf` file on the PEM server host must allow connections between the PEM server and PEM-HTTPD, the PEM agent, and the monitored servers.

During the PEM server installation process, you are prompted for the IP address and connection information for hosts that will be monitored by PEM; this information is added to the top of the `pg_hba.conf` file of the PEM backing database.



You may also need to manually modify the `pg_hba.conf` file to allow connections between the PEM server and other components. For example, if your PEM-HTTPD installation does not reside on the same host as the PEM server, you must modify the `pg_hba.conf` file on the PEM server host to allow PEM-HTTPD to connect to the server.

By default, the `pg_hba.conf` file resides in the data directory, under your Postgres installation; for example, on an Advanced Server 10 host, the default location of the pg_hba.conf is:

```
/var/lib/edb/as10/data/pg_hba.conf
```

You can modify the `pg_hba.conf` file with your editor of choice. After modifying the file, restart the server for changes to take effect.

The following example shows a `pg_hba.conf` entry that allows an md5 password authenticated connection from a user named `postgres`, to the `postgres` database on the host on which the pg_hba.conf file resides. The connection is coming from an IP address of `192.168.10.102`:

```
### TYPE      DATABASE         USER         CIDR-ADDRESS          METHOD
### IPv4 local connections:
 host     postgres        postgres     192.168.10.102/32        md5
```

You may specify the address of a network host, or a network address range. For example, if you wish to allow connections from servers with the addresses `192.168.10.23`, `192.168.10.76` and `192.168.10.184`, enter a CIDR-ADDRESS of `192.168.10.0/24` to allow connections from all of the hosts in that network:

```
### TYPE      DATABASE         USER         CIDR-ADDRESS        METHOD
### IPv4 local connections:
  host      postgres         all        192.168.10.0/24        md5
```

For more information about formatting a `pg_hba.conf` file entry, please see the PostgreSQL core documentation.

Before you can connect to a Postgres server with PEM, you must ensure that the `pg_hba.conf` file on both servers allows the connection.

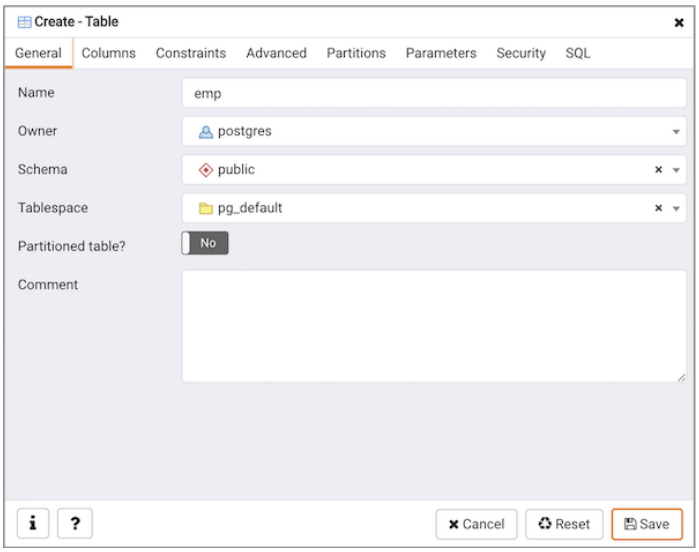
If you receive this error when connecting to the database server, modify the `pg_hba.conf` file, adding an entry that allows the connection.

Creating and Maintaining Databases and Objects

Each instance of a Postgres server manages one or more databases; each user must provide authentication information to connect to the database before accessing the information contained within it. The PEM client provides dialogs that allow you to create and manage databases, and all of the various objects that comprise a database (e.g. tables, indexes, stored procedures, etc.).

Creating a database is easy in PEM: simply right click on any managed server's `Databases` node and select `Database...` from the `Create` menu. After defining a database, you can create objects within the new database.

For example, to create a new table, right click on a `Tables` node, and select `Table...` from the `Create` menu. When the `New Table` dialog opens, specify the attributes of the new table.



PEM provides similar dialogs for the creation and management of other database objects:

- tables
- indexes
- stored procedures
- functions
- triggers
- views
- constraints, etc.

Each object type is displayed in the tree control; right click on the node that corresponds to an object type to access the `Create` menu and create a new object, or select `Properties` from the context menu of a named node to perform administrative tasks for the highlighted object.

Managing PEM Authentication

Postgres supports a number of authentication methods:

- Secure password (md5)
- GSSAPI
- SSPI
- Kerberos
- Ident
- LDAP
- RADIUS
- Certificate (SSL)
- PAM

Postgres (and PEM) authentication is controlled by the `pg_hba.conf` configuration file. Entries within the configuration file specify who may connect to a specific database, and the type of authentication required before that user is allowed to connect.

A typical entry in the `pg_hba.conf` file that allows a user named `postgres` to connect to all databases from the local host (127.0.0.1/32) using secure password (md5) authentication connections would take the form:

```
host all postgres 127.0.0.1/32 md5
```

Depending on your system's configuration, you may also need to create a password file for the user account that the PEM agent uses to connect to the server, to allow the agent to properly respond to the server's authentication request. An entry in the password file for a user named `postgres`, with a password of `1safepwd` would take the form:

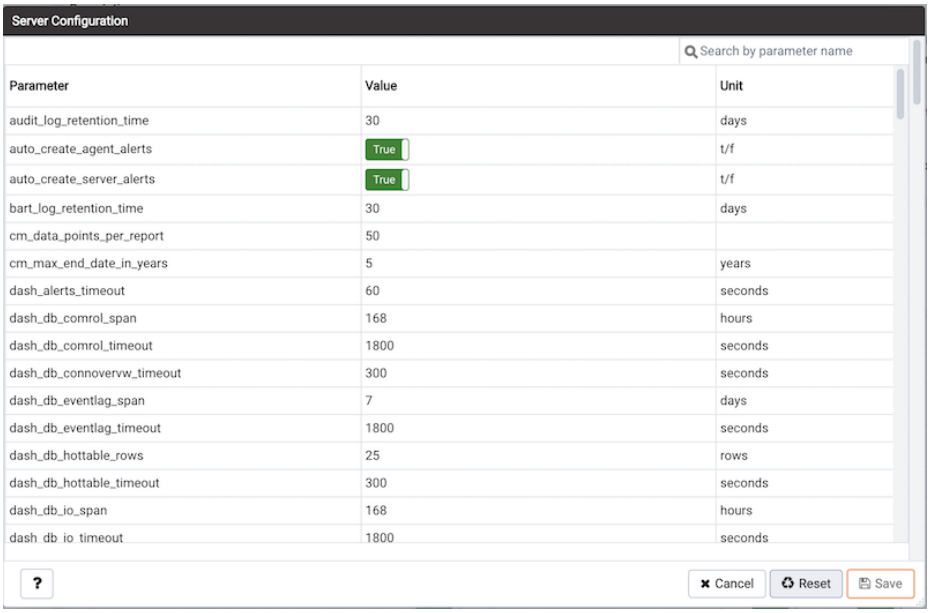
```
localhost:5432:*:postgres:1safepwd
```

The password file is usually named `~root/.pgpass` on Linux systems, or `%APPDATA%\postgresql\pgpass.conf` (on Windows). For more information about configuring a password file, visit the PostgreSQL website.

For more information about the authentication methods supported by Postgres, see the PostgreSQL core documentation.

Editing the PEM Server Configuration

You can use the PEM client to graphically manage the configuration parameters of the PEM server to enable features or modify default settings. To open the `Server Configuration` dialog, select `Server Configuration…` from the `Management` menu.



To modify a parameter value, edit the content displayed in the `Value` field to the right of a parameter name. Click the `Save` button to preserve your changes, or click the `Close` button to exit the dialog without applying the changes. Use the `Reset` button to return the parameters to their original value.

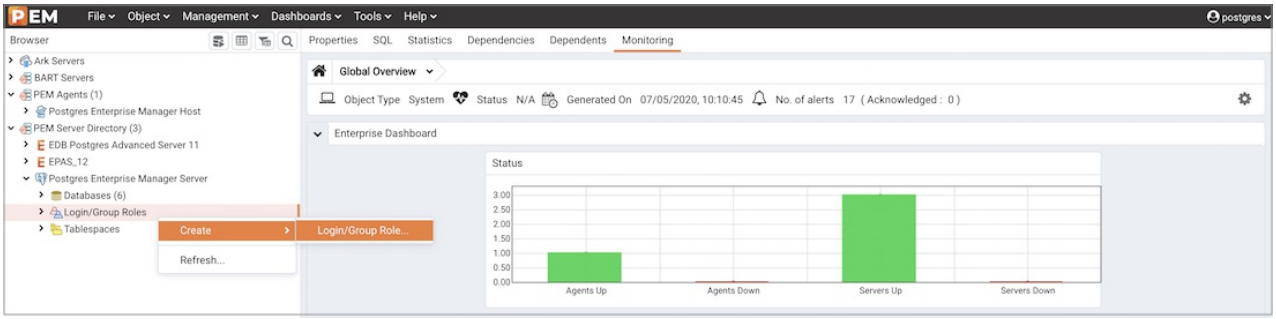
Managing Security

PEM provides a graphical way to manage your Postgres roles and servers.

Login Roles

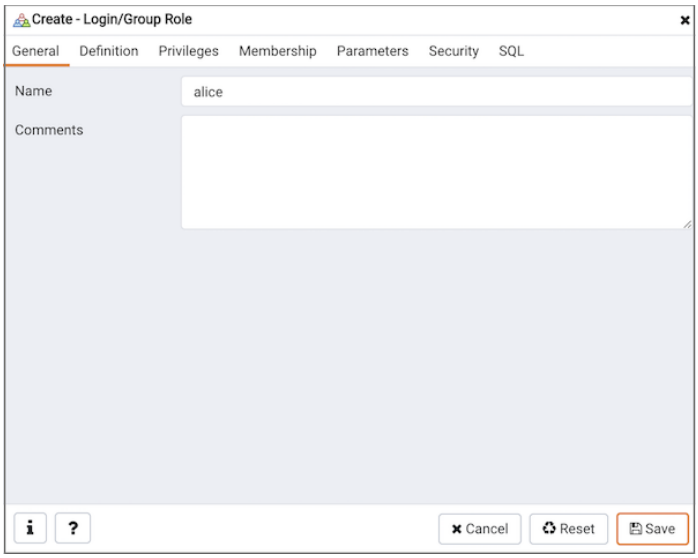
When you connect to the PEM server, you must provide role credentials that allow access to the database on which the PEM server stores data. By default, the postgres superuser account is used to initially connect to the server, but it is strongly recommended (for both security and auditing purposes) that individual roles are created for each connecting user. You can use the PEM Query Tool, the PEM web interface `Create - Login/Group Role` dialog, or a command line client (such as psql) to create a role.

To use the `Create - Login/Group Role` dialog to create a role, expand the node for the server on which the role will reside in the PEM tree control, and right-click on the `Login/Group Roles` node to access the context menu. Then, select `Login/Group Role...` from the `Create` menu.



Use fields on the tabs of the `Create - Login/Group` Role dialog to define the role. To display the PEM online help in a browser tab, click the help (`?`) button located in the lower-left corner of the dialog.

When you've finished defining the new role, click `Save` to create the role.



To modify the properties of an existing login role, right click on the name of a login role in the tree control, and select `Properties` from the context menu. To delete a login role, right click on the name of the role, and select `Delete/Drop` from the context menu.

For more complete information about creating and managing a role, see the PostgreSQL online documentation.

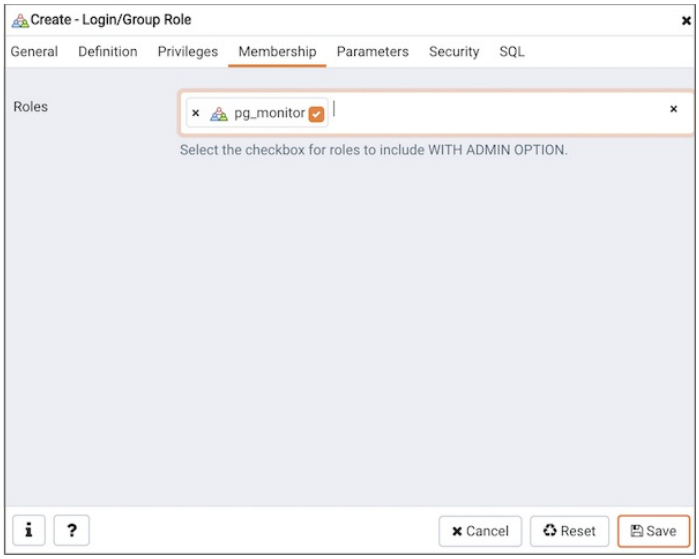
Group Roles

Group roles can serve as containers, used to dispense system privileges (such as creating databases) and object privileges (e.g. inserting data into a particular table). The primary purpose of a group role is to make the mass management of system and object permissions much easier for a DBA. Rather than assigning or modifying privileges individually across many different login accounts, you can assign or change privileges for a single role and then grant that role to many login roles at once.

Use the `Group Roles` node (located beneath the name of each registered server in the PEM tree control) to create and manage group roles. Options on the context menu provide access to a dialog that allows you to create a new role or modify the properties of an existing role. You can find more information about creating roles here.

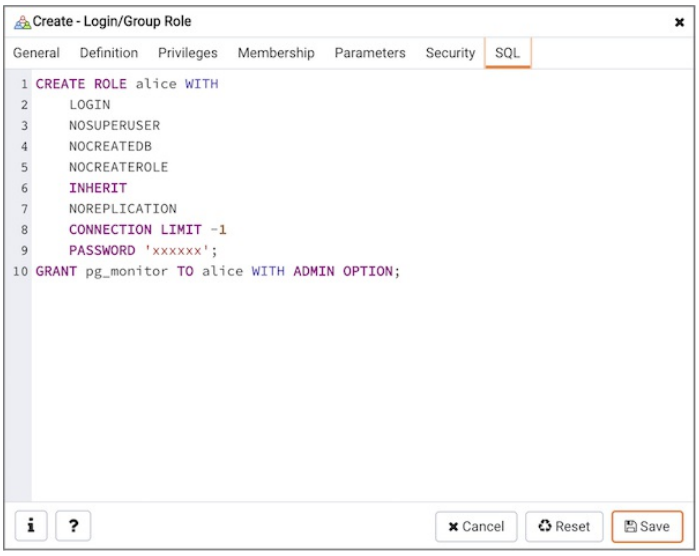
Using PEM Pre-Defined Roles to Manage Access to PEM Functionality

You can use the `Login/Group Role` dialog to allow a role with limited privileges to access PEM features such as the Audit Manager, Capacity Manager, or SQL Profiler. PEM pre-defined roles allow access to PEM functionality; roles that are assigned membership in these roles can access the associated feature.



When defining a user, use the `Membership` tab to specify the roles in which the new user is a member. The new user will share the privileges associated with each role in which it is a member. For a user to have access to PEM extended functionality, the role must be a member of the pem_user role and the pre-defined role that grants access to the feature. Use the `Roles` field to select pre-defined role names from a drop down list.

The `SQL` tab displays the SQL command that the server will execute when you click `Save`.



The example shown above creates a login role named `acctg_clerk` that will have access to the `Audit Manager`; the role can make unlimited connections to the server at any given time.

You can use PEM pre-defined roles to allow access to the functionality listed in the table below:

Value	Parent Role	Description
pem_super_admin		Role to manage/configure everything on Postgres Enteprise Manager.

Value	Parent Role	Description
pem_admin	pem_super_admin	Role for administration/management/configuration of all visible agents/servers, and monitored objects.
pem_config	pem_admin	Role for configuration management of Postgres Enterprise Manager.
pem_component	pem_admin	Role to run/execute all wizard/dialog based components.
pem_rest_api	pem_admin	Role to access the REST API.
pem_server_service_manager	pem_admin	Role for allowing to restart/reload the monitored database server (if server-id provided).
pem_manage_schedule_task	pem_admin	Role to configure the schedule tasks.
pem_manage_alert	pem_admin	Role for managing/configuring alerts, and its templates.
pem_config_alert	pem_config, pem_manage_alert	Role for configuring the alerts on any monitored objects.
pem_manage_probe	pem_admin	Role to create, update, delete the custom probes, and change custom probe configuration.
pem_config_probe	pem_config, pem_manage_probe	Role for probe configuration (history retention, execution frequency, enable/disable the probe) on all visible monitored objects.
pem_database_server_registration	pem_admin	Role to register a database server.
pem_comp_postgres_expert	pem_component	Role to run the Postgres Expert.
pem_comp_auto_discovery	pem_component	Role to run the Auto discovery of a database server dialog.
pem_comp_log_analysis_expert	pem_component	Role to run the Log Analysis Expert.
pem_comp_sqlprofiler	pem_component	Role to run the SQL Profiler.
pem_manage_efm	pem_admin	Role to manage Failover Manager functionality.
pem_comp_capacity_manager	pem_component	Role to run the Capacity Manager.
pem_comp_log_manager	pem_component	Role to run the Log Manager.
pem_comp_audit_manager	pem_component	Role to run the Audit Manager.
pem_comp_tuning_wizard	pem_component	Role to run the Tuning Wizard.

Using a Team Role

When you register a server for monitoring by PEM, you can specify a *Team* that will be associated with the server. A Team is a group role that can be used to allow or restrict access to one or more monitored servers to a limited group of role members. The PEM client will only display a server with a specified

Team to those users who are:

- a member of the Team role
- the role that created the server
- a role with superuser privileges on the PEM server.

To create a team role, expand the node for the server on which the role will reside in the PEM tree control, and right-click on the `Login/Group Roles` node to access the context menu. Then, select `Login/Group Role…` from the `Create` menu; when the `Create - Login/Group Role` dialog opens, use the fields provided to specify the properties of the team role.

Object Permissions

A role must be granted sufficient privileges before accessing, executing, or creating any database object. PEM allows you to assign (`GRANT`) and remove (`REVOKE`) object permissions to group roles or login accounts using the graphical interface of the PEM client.

Object permissions are managed via the graphical object editor for each particular object. For example, to assign privileges to access a database table, right click on the table name in the tree control, and select the Properties option from the context menu. Use the options displayed on the Privileges tab to assign privileges for the table.

The PEM client also contains a `Grant Wizard` (accessed through the `Tools` menu) that allows you to manage many object permissions at once.

Managing Job Notifications

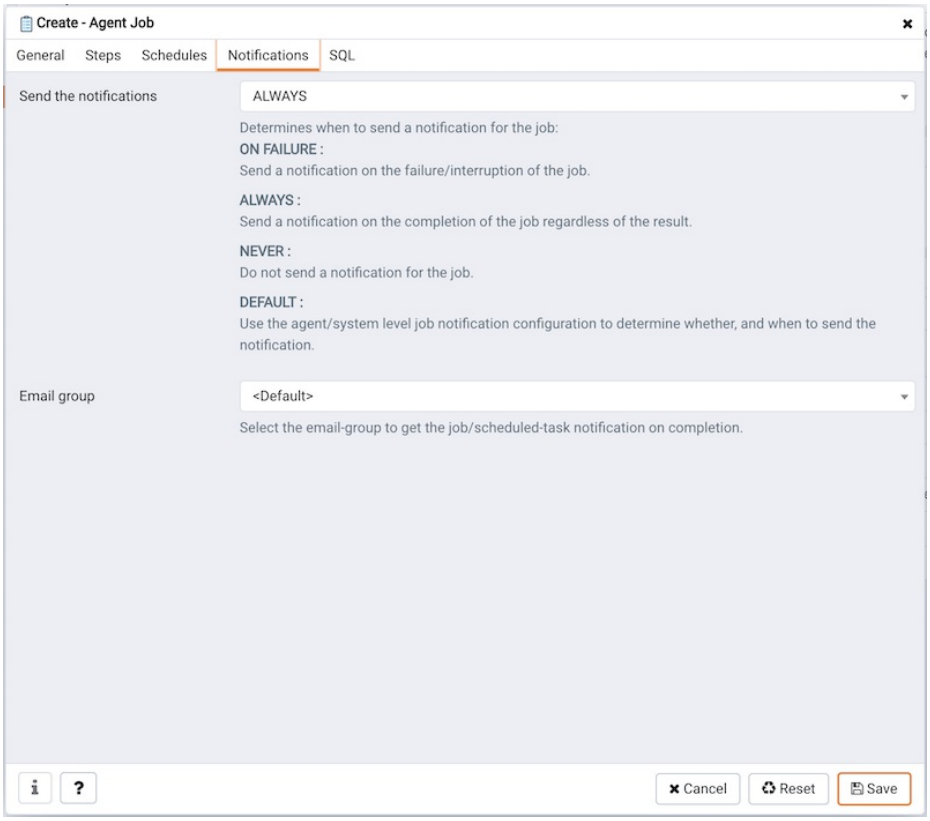
You can configure the settings in PEM console for sending the SMTP trap on success or failure of a system-generated job (listed under scheduled tasks) or a custom-defined agent job. These email notification settings can be configured at following three levels (in order of precedence) to send email notifications to the specified user group:

- Job level
- Agent level
- PEM server level (default level)

Configuring Job Notifications at Job Level

You can configure email notification settings at job level only for a custom-defined agent job in one of the following ways:

- For a new agent job, you can configure the email notification settings in the `Notification` tab of `Create-Agent Job` wizard while creating the job itself.
- For an existing custom-defined job, you can edit the properties of the job and configure the notification settings.

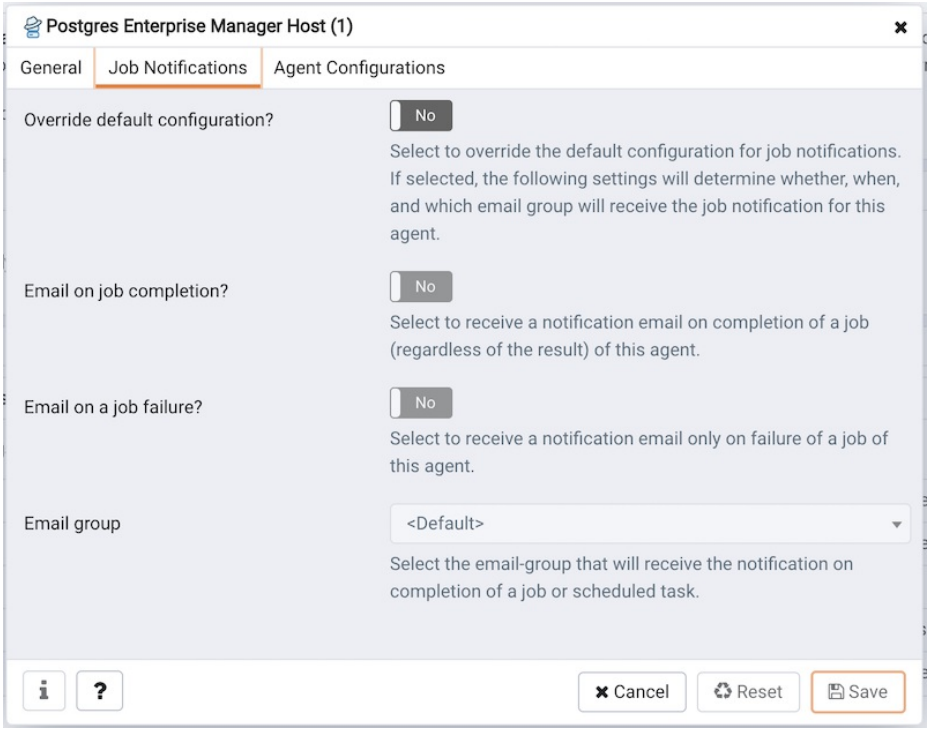


Use the fields on the `Notifications` tab to configure the email notification settings on job level:

- Use the `Send the notifications` field to specify when you want the email notifications to be sent.
- Use the `Email group` field to specify the email group that should receive the email notification.

Configuring Job Notifications at Agent Level

Select the agent in the tree view, right click and select *Properties*. In the `Properties` dialog, select the *Job notifications* tab.

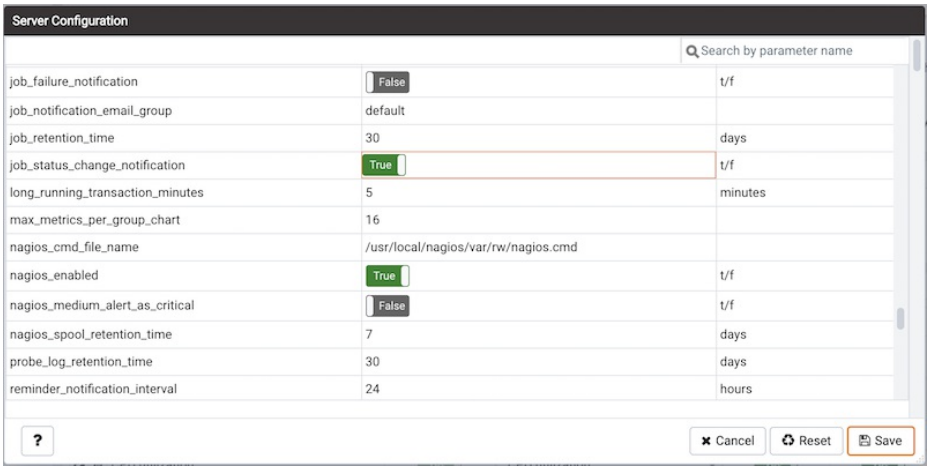


Use the fields on the Job notifications tab to configure the email notification settings on agent level:

- Use the `Override default configuration?` switch to specify if you want the agent level job notification settings to override the default job notification settings. If you select *Yes* for this switch, you can use the rest of the settings on this dialog to define when and to whom the job notifications should be sent. Please note that the rest of the settings on this dialog work only if you enable the `Override default configuration?` switch.
- Use the `Email on job completion?` switch to specify if the job notification should be sent on the successful job completion.
- Use the `Email on a job failure?` switch to specify if the job notification should be sent on the failure of a job.
- Use the `Email group` field to specify the email group to whom the job notification should be sent.

Configuring Job Notifications at Server Level

You can use the *Server Configuration* dialog to provide information about your email notification configuration at PEM server level. To open the Server Configuration dialog, select *Server Configuration...* from the PEM client's Management menu.



Four server configuration parameters specify information about your job notification preferences at PEM server level:

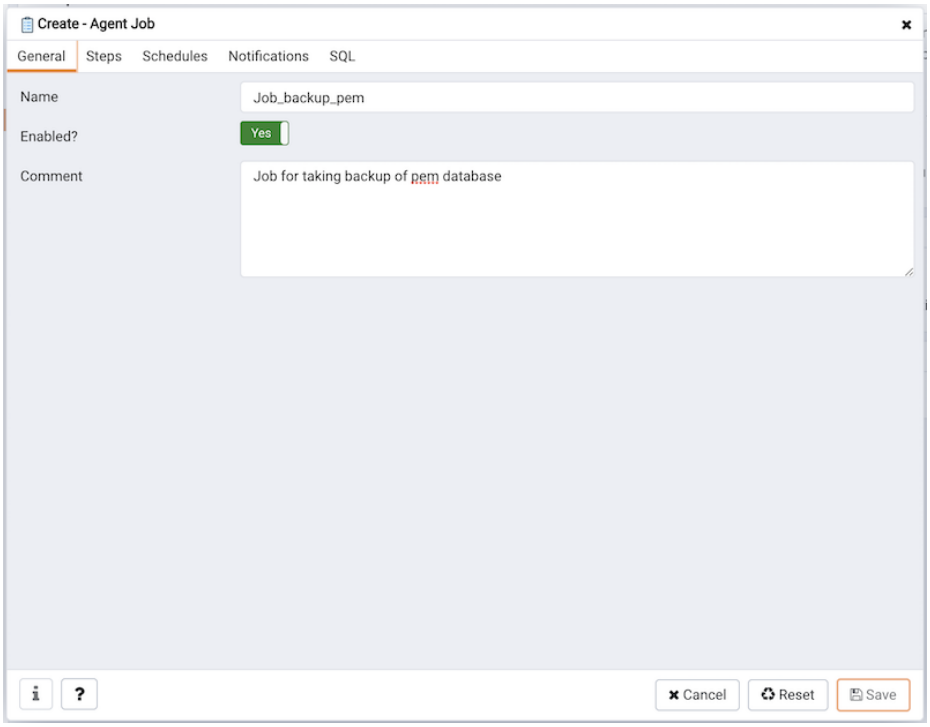
- Use the `job_failure_notification` switch to specify if you want to send email notification after each job failure.
- Use the `job_notification_email_group` parameter to specify the email group that should receive the email notification.
- Use the `job_retention_time parameter` to specify the number of days that non-recurring scheduled tasks should be retained in the system.
- Use the `job_status_change_notification` switch to specify if you want to send email notification after each job status change, irrespective of its status being a failure, success, or interrupted.

Managing PEM Scheduled Jobs

You can create a PEM scheduled job to perform a set of custom-defined steps in the specified sequence. These steps may contain SQL code or a batch/shell script that you may run on a server that is bound with the agent. You can schedule these jobs to suit your business requirements. For example, you can create a job for taking a backup of a particular database server and schedule it to run on a specific date and time of every month.

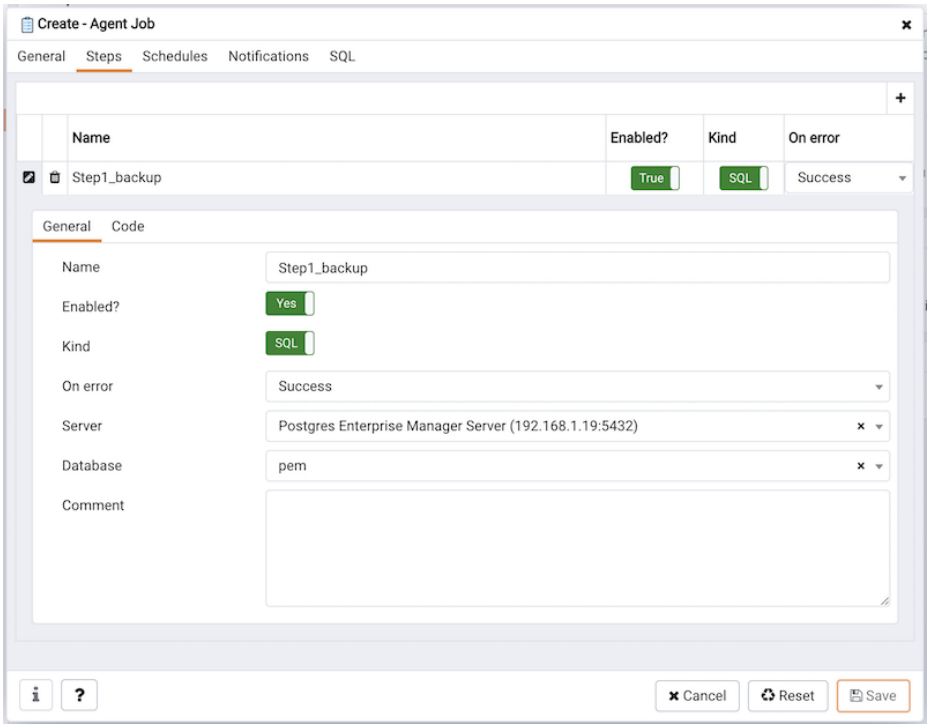
To create or manage a PEM scheduled job, use the PEM tree control to browse to the PEM agent for which you want to create the job. The tree control will display a Jobs node, under which currently defined jobs are displayed. To add a new job, right click on the `Jobs` node, and select `Create Job...` from the context menu.

When the `Create - Agent Job` dialog opens, use the tabs on the `Create - Agent Job` dialog to define the steps and schedule that make up a PEM scheduled job.

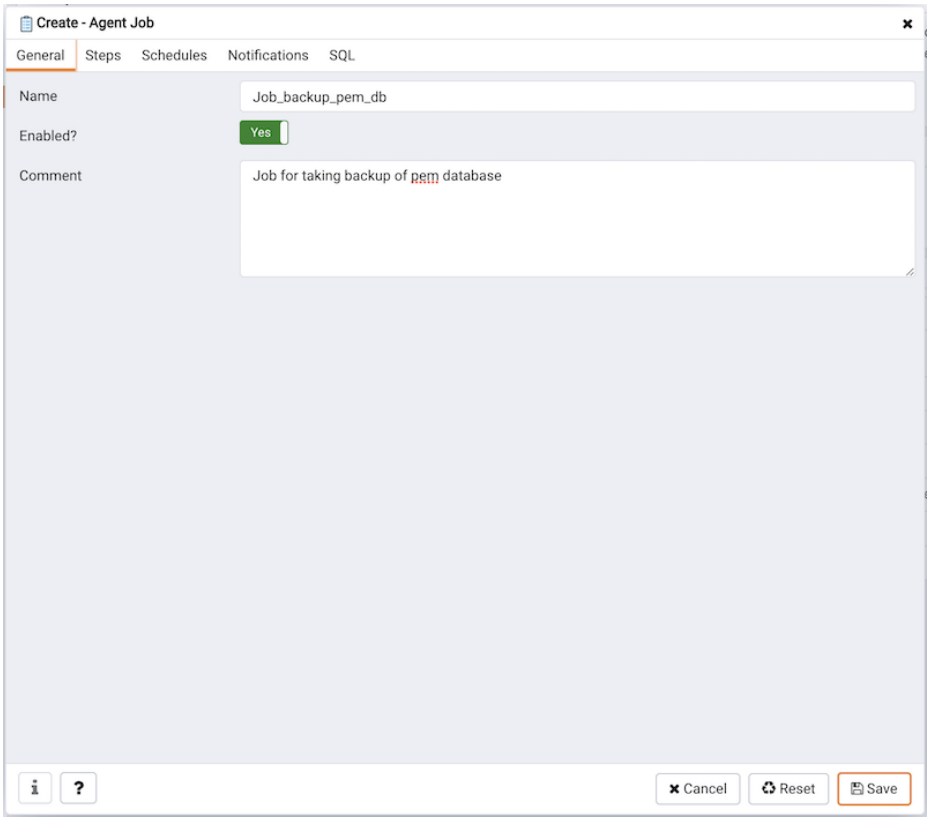


Use the fields on the `General` tab to provide general information about a job:

- Provide a name for the job in the `Name` field.
- Move the `Enabled` switch to the `Yes` position to enable a job, or `No` to disable a job.
- Use the `Comment` field to store notes about the job.



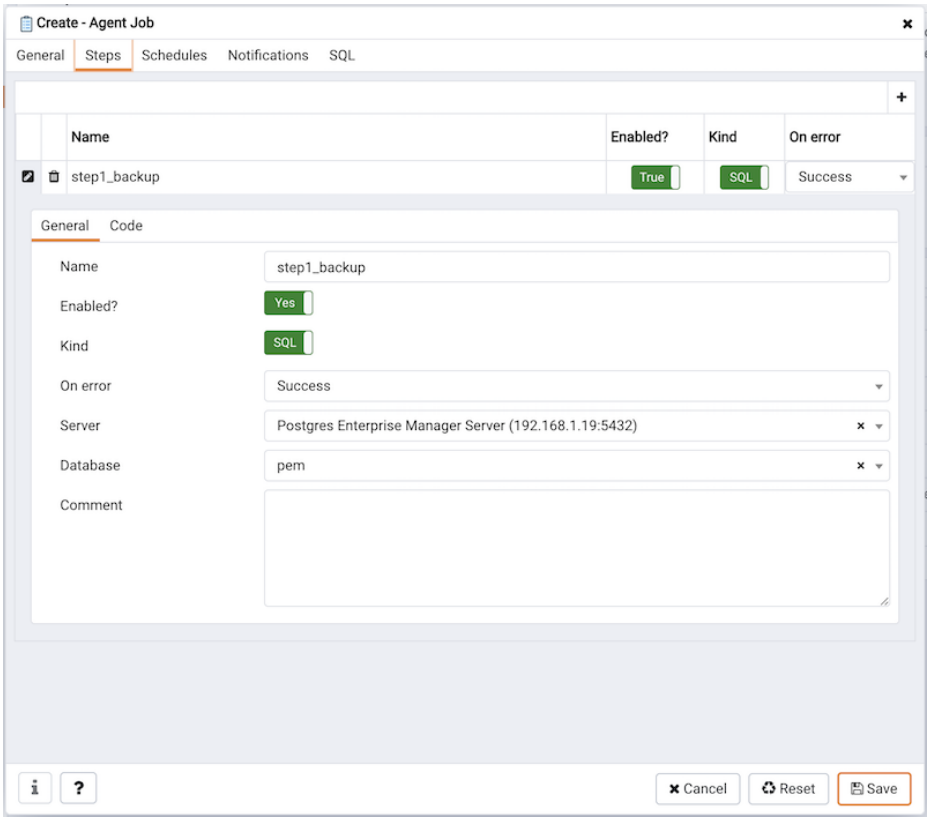
Use the `Steps` tab to define and manage the steps that the job will perform. Click the `Add` icon (+) to add a new step; then click the compose icon (located at the left side of the header) to open the step definition dialog:



Use fields on the step definition dialog to define the step:

- Provide a name for the step in the `Name` field; please note that steps will be performed in alphanumeric order by name.
- Use the `Enabled` switch to include the step when executing the job (`True`) or to disable the step (`False`).
- Use the `Kind` switch to indicate if the job step invokes SQL code (`SQL`) or a batch script (`Batch`).
    - If you select `SQL`, use the `Code` tab to provide SQL code for the step.
    - If you select `Batch`, use the `Code` tab to provide the batch script that will be executed during the step.
- Use the `On error` drop-down to specify the behavior of pgAgent if it encounters an error while executing the step. Select from:
    - Fail - Stop the job if you encounter an error while processing this step.
    - Success - Mark the step as completing successfully, and continue.
    - Ignore - Ignore the error, and continue.
- If you have selected SQL as your input for `Kind` switch, provide the following additional information:
    - Use the `Server` field to specify the server that is bound with the agent for which you are creating the PEM scheduled job.
    - Use the `Database` field to specify the database that is associated with the server that you have selected.

- Use the `Comment` field to provide a comment about the step.

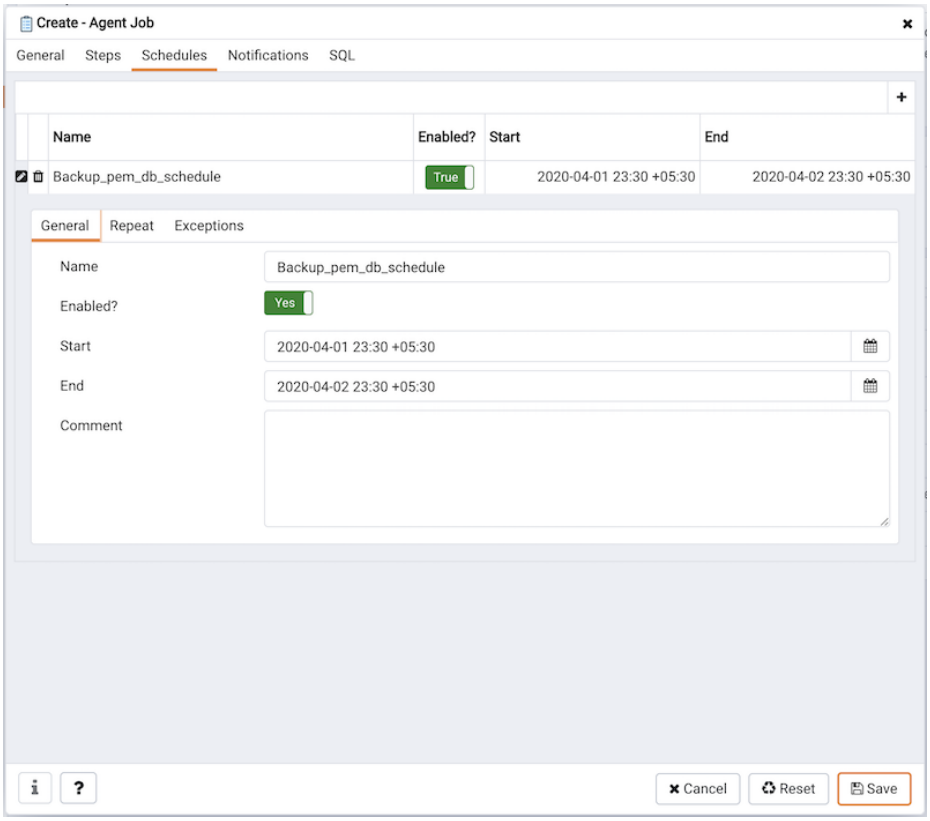


- Use the context-sensitive field on the step definition dialog's `Code` tab to provide the SQL code or batch script that will be executed during the step:
  - If the step invokes SQL code, provide one or more SQL statements in the `SQL query` field.
  - If the step invokes a batch script, provide the script in the `Code` field. If you are running on a Windows server, standard batch file syntax must be used. When running on a Linux server, any shell script may be used, provided that a suitable interpreter is specified on the first line (e.g. *#!/bin/sh*). Along with the defined inline code, you can also provide the path of any batch script, shell script, or SQL file on the filesystem.
    - To invoke a script on a Linux system, you must modify the entry for `batch_script_user` parameter in the `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`.

After providing all the information required by the step, click the `Save` button to save and close the step definition dialog.

Click the add icon (+) to add each additional step, or select the `Schedules` tab to define the job schedule.

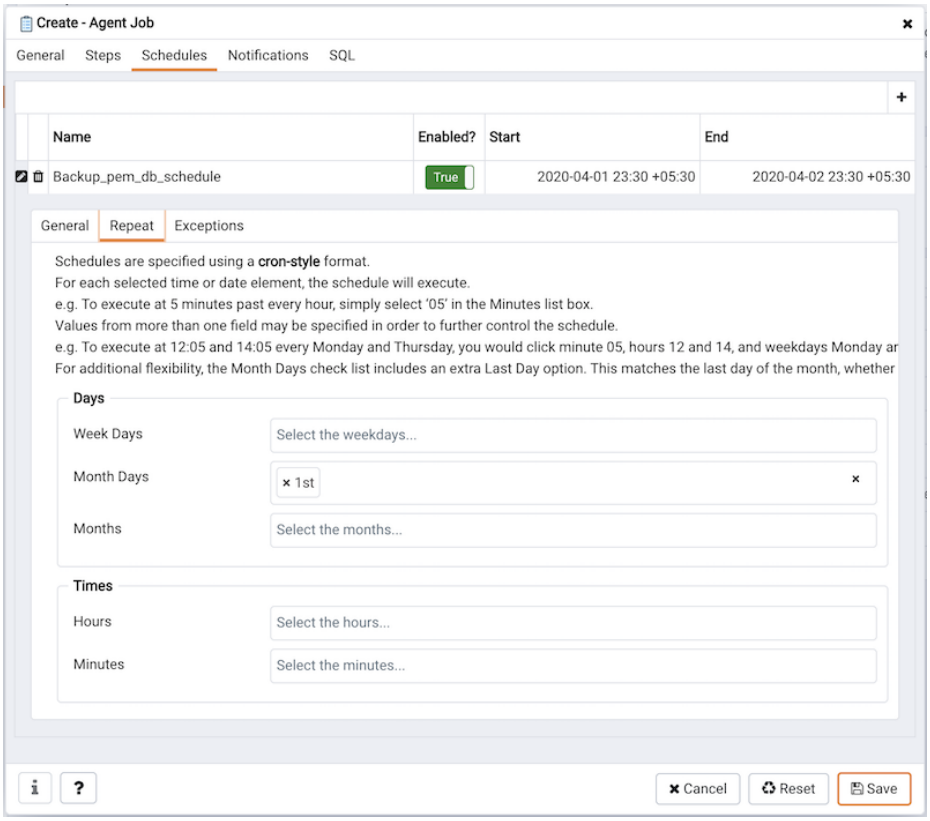
Click the add icon (+) to add a schedule for the job; then click the compose icon (located at the left side of the header) to open the schedule definition dialog:



Use the fields on the `Schedules definition` tab to specify the days and times at which the job will execute.

- Provide a name for the schedule in the `Name` field.
- Use the `Enabled` switch to indicate that pgAgent should use the schedule (`Yes`) or to disable the schedule (`No`).
- Use the calendar selector in the `Start` field to specify the starting date and time for the schedule.
- Use the calendar selector in the `End` field to specify the ending date and time for the schedule.
- Use the `Comment` field to provide a comment about the schedule.

Select the `Repeat` tab to define the days on which the schedule will execute.



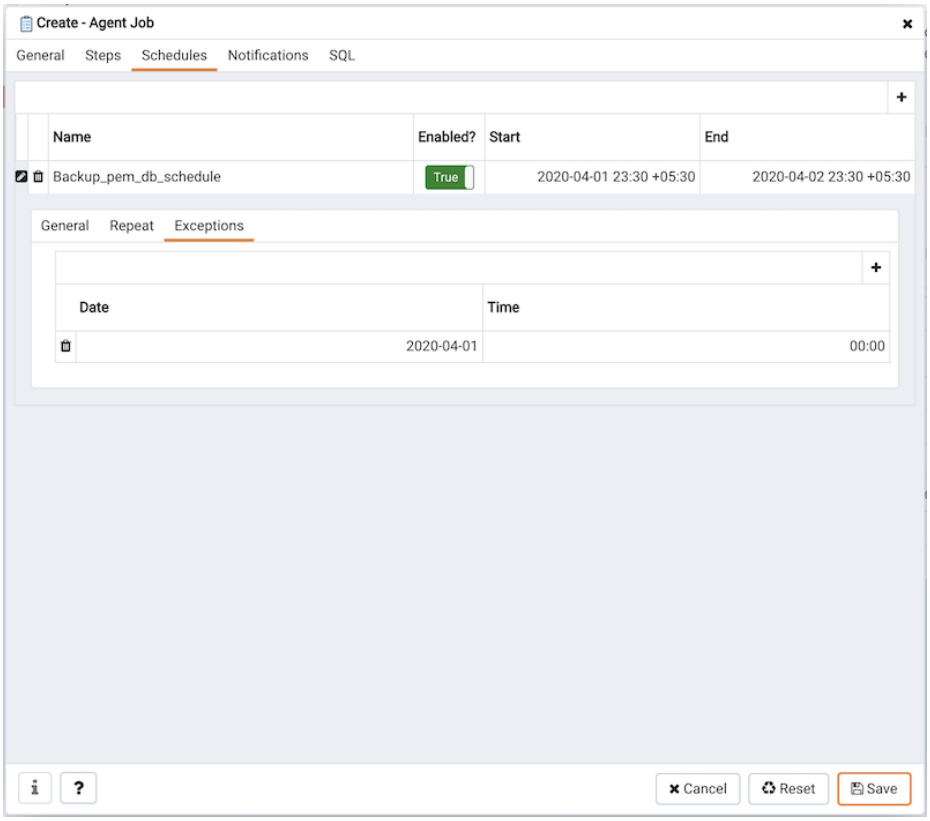
Use the fields on the `Repeat` tab to specify the details about the schedule in a cron-style format. The job will execute on each date or time element selected on the `Repeat` tab.

Click within a field to open a list of valid values for that field; click on a specific value to add that value to the list of selected values for the field. To clear the values from a field, click the X located at the right-side of the field.

- Use the fields within the `Days` box to specify the days on which the job will execute:
  - Use the `Week Days` field to select the days on which the job will execute.
  - Use the `Month Days` field to select the numeric days on which the job will execute. Specify the `Last Day` to indicate that the job should be performed on the last day of the month, irregardless of the date.
  - Use the `Months` field to select the months in which the job will execute.

- Use the fields within the `Times` box to specify the times at which the job will execute:
  - Use the `Hours` field to select the hour at which the job will execute.
  - Use the `Minutes` field to select the minute at which the job will execute.

Select the `Exceptions` tab to specify any days on which the schedule will `not` execute.

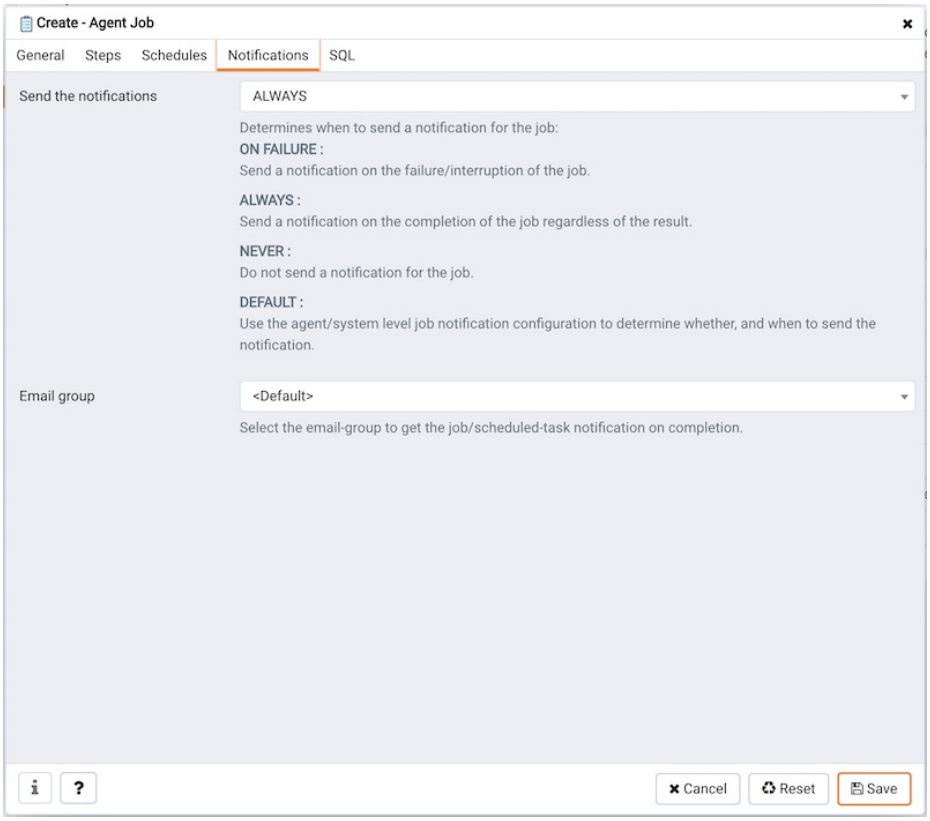


Use the fields on the `Exceptions` tab to specify days on which you wish the job to not execute; for example, you may wish for jobs to not execute on national holidays.

Click the Add icon (+) to add a row to the exception table, then:

- Click within the `Date` column to open a calendar selector, and select a date on which the job will not execute. Specify `<Any>` in the `Date` column to indicate that the job should not execute on any day at the time selected.
- Click within the `Time` column to open a time selector, and specify a time on which the job will not execute. Specify `<Any>` in the `Time` column to indicate that the job should not execute at any time on the day selected.

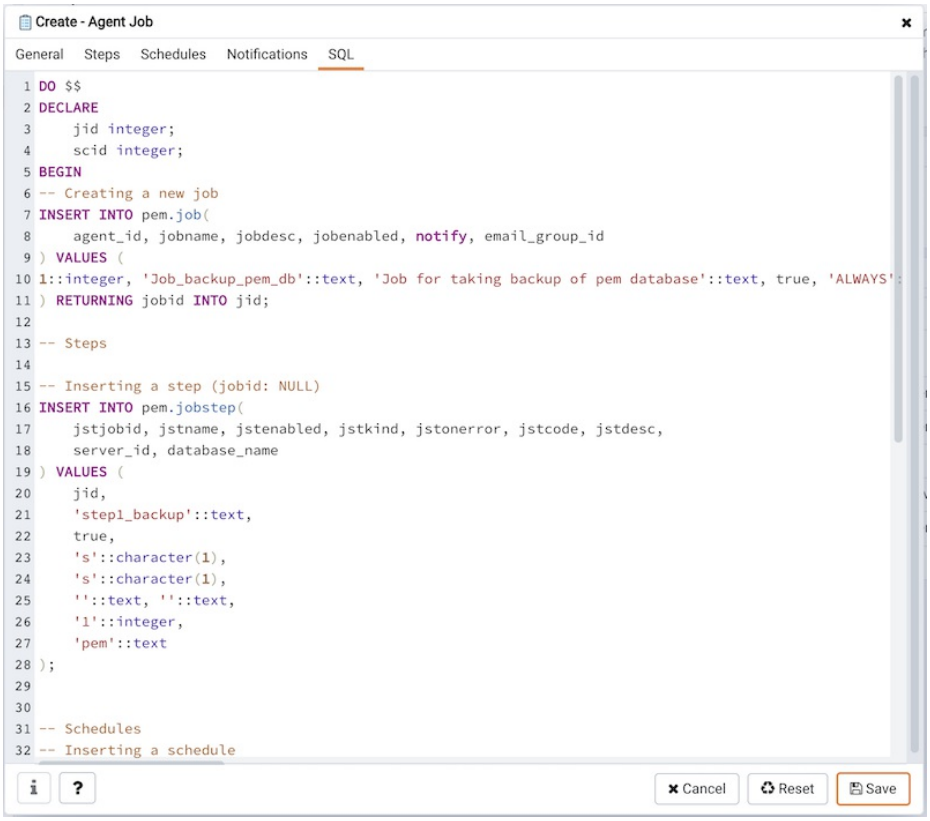
Select the `Notifications` tab to configure the email notification settings on job level:



Use the fields on the `Notifications` tab to configure the email notification settings for a job:

- Use the `Send the notifications` field to specify when you want the email notifications to be sent.
- Use the `Email group` field to specify the email group that should receive the email notification.

When you've finished defining the schedule, you can use the `SQL` tab to review the code that will create or modify your job.



Click the `Save` button to save the job definition, or `Cancel` to exit the job without saving. Use the `Reset` button to remove your unsaved entries from the dialog.

After saving a job, the job will be listed under the `Jobs` node of the PEM tree control of the server on which it was defined. The `Properties` tab in the PEM console will display a high-level overview of the selected job, and the Statistics tab will show the details of each run of the job. To modify an existing job or to review detailed information about a job, right-click on a job name, and select `Properties` from the context menu.

7 Managing a PEM Agent

The sections that follow provide information about the behavior and management of a PEM agent.

Agent Privileges

By default, the PEM agent is installed with `root` privileges for the operating system host and superuser privileges for the database server. These privileges allow the PEM agent to invoke unrestricted probes on the monitored host and database server about system usage, retrieving and returning the information to the PEM server.

Please note that PEM functionality diminishes as the privileges of the PEM agent decrease. For complete

functionality, the PEM agent should run as `root`. If the PEM agent is run under the database server's service account, PEM probes will not have complete access to the statistical information used to generate reports, and functionality will be limited to the capabilities of that account. If the PEM agent is run under another lesser-privileged account, functionality will be limited even further.

If you limit the operating system privileges of the PEM agent, some of the PEM probes will not return information, and the following functionality may be affected:

Probe or Action	Operating System	PEM Functionality Affected
Data And Logfile Analysis	Linux/ Windows	The Postgres Expert will be unable to access complete information.
Session Information	Linux	The per-process statistics will be incomplete.
PG HBA	Linux/ Windows	The Postgres Expert will be unable to access complete information.
Service restart functionality	Linux/ Windows	The Audit Log Manager, Server Log Manager Log Analysis Expert and PEM may be unable to apply requested modifications.
Package Deployment	Linux/ Windows	PEM will be unable to run downloaded installation modules.
Batch Task	Windows	PEM will be unable to run scheduled batch jobs in Windows.
Collect data from server (root access required)	Linux/ Windows	Columns such as swap usage, CPU usage, IO read, IO write will be displayed as 0 in the session activity dashboard.

!!! Note The above-mentioned list is not comprehensive, but should provide an overview of the type of functionality that will be limited.

If you restrict the database privileges of the PEM agent, the following PEM functionality may be affected:

Probe	Operating System	PEM Functionality Affected
Audit Log Collection	Linux/Windows	PEM will receive empty data from the PEM database.
Server Log Collection	Linux/Windows	PEM will be unable to collect server log information.
Database Statistics	Linux/Windows	The Database/Server Analysis dashboards will contain incomplete information.
Session Waits/System Waits	Linux/Windows	The Session/System Waits dashboards will contain incomplete information.
Locks Information	Linux/Windows	The Database/Server Analysis dashboards will contain incomplete information.
Streaming Replication	Linux/Windows	The Streaming Replication dashboard will not display information.
Slony Replication	Linux/Windows	Slony-related charts on the Database Analysis dashboard will not display information.

Probe	Operating System	PEM Functionality Affected
Tablespace Size	Linux/Windows	The Server Analysis dashboard will not display complete information.
xDB Replication	Linux/Windows	PEM will be unable to send xDB alerts and traps.

If the probe is querying the operating system with insufficient privileges, the probe may return a `permission denied` error.

If the probe is querying the database with insufficient privileges, the probe may return a `permission denied` error or display the returned data in a PEM chart or graph as an empty value.

When a probe fails, an entry will be written to the log file that contains the name of the probe, the reason the probe failed, and a hint that will help you resolve the problem.

You can view probe-related errors that occurred on the server in the `Probe Log` dashboard, or review error messages in the PEM worker log files. On Linux, the default location of the log file is:

`/var/log/pem/worker.log`

On Windows, log information is available on the `Event Viewer`.

Agent Configuration

A number of user-configurable parameters and registry entries control the behavior of the PEM agent. You may be required to modify the PEM agent's parameter settings to enable some PEM functionality. After modifying values in the PEM agent configuration file, you must restart the PEM agent to apply any changes.

With the exception of the `PEM_MAXCONN` parameter, we strongly recommend against modifying any of the configuration parameters or registry entries listed below without first consulting EDB support experts *unless* the modifications are required to enable PEM functionality.

On Linux systems, PEM configuration options are stored in the `agent.cfg` file, located in `/usr/edb/pem/agent/etc`. The `agent.cfg` file contains the following entries:

Parameter Name	Description	Default Value
pem_host	The IP address or hostname of the PEM server.	127.0.0.1.
pem_port	The database server port to which the agent connects to communicate with the PEM server.	Port 5432.
pem_agent	A unique identifier assigned to the PEM agent.	The first agent is '1', the second agent is '2', and so on.
agent_ssl_key	The complete path to the PEM agent's key file.	/root/.pem/agent.key

Parameter Name	Description	Default Value
agent_ssl_crt	The complete path to the PEM agent's certificate file.	/root/.pem/agent.crt
agent_flag_dir	Used for HA support. Specifies the directory path checked for requests to take over monitoring another server. Requests are made in the form of a file in the specified flag directory.	Not set by default.
log_level	Log level specifies the type of event that will be written to the PEM log files.	warning
log_location	Specifies the location of the PEM worker log file.	127.0.0.1.
agent_log_location	Specifies the location of the PEM agent log file.	/var/log/pem/agent.log
long_wait	The maximum length of time (in seconds) that the PEM agent will wait before attempting to connect to the PEM server if an initial connection attempt fails.	30 seconds
short_wait	The minimum length of time (in seconds) that the PEM agent will wait before checking which probes are next in the queue (waiting to run).	10 seconds
alert_threads	The number of alert threads to be spawned by the agent.	Set to 1 for the agent that resides on the host of the PEM server; 0 for all other agents.
enable_smtp	When set to true for multiple PEM Agents (7.13 or lesser) it may send more duplicate emails. Whereas for PEM Agents (7.14 or higher) it may send lesser duplicate emails.	true for PEM server host; false for all others.
enable_snmp	When set to true for multiple PEM Agents (7.13 or lesser) it may send more duplicate traps. Whereas for PEM Agents (7.14 or higher) it may send lesser duplicate traps.	true for PEM server host; false for all others.
enable_nagios	When set to true, Nagios alerting is enabled.	true for PEM server host; false for all others.
enable_webhook	When set to true, Webhook alerting is enabled.	true for PEM server host; false for all others.
max_webhook_retries	Set maximum number of times pemAgent should retry to call webhooks on failure.	Default 3.
connect_timeout	The max time in seconds (a decimal integer string) that the agent will wait for a connection.	Not set by default; set to 0 to indicate the agent should wait indefinitely.

Parameter Name	Description	Default Value
allow_server_restart	If set to TRUE, the agent can restart the database server that it monitors. Some PEM features may be enabled/disabled, depending on the value of this parameter.	False
max_connections	The maximum number of probe connections used by the connection throttler.	0 (an unlimited number)
connection_lifetime	Use ConnectionLifetime (or connection_lifetime) to specify the minimum number of seconds an open but idle connection is retained. This parameter is ignored if the value specified in MaxConnections is reached and a new connection (to a different database) is required to satisfy a waiting request.	By default, set to 0 (a connection is dropped when the connection is idle after the agent's processing loop).
allow_batch_probes	If set to TRUE, the user will be able to create batch probes using the custom probes feature.	false
heartbeat_connection	When set to TRUE, a dedicated connection is used for sending the heartbeats.	false
batch_script_dir	Provide the path where script file (for alerting) will be stored.	/tmp
connection_custom_setup	Use to provide SQL code that will be invoked when a new connection with a monitored server is made.	Not set by default.
ca_file	Provide the path where the CA certificate resides.	Not set by default.
batch_script_user	Provide the name of the user that should be used for executing the batch/shell scripts.	None
webhook_ssl_key	The complete path to the webhook's SSL client key file.	
webhook_ssl_crt	The complete path to the webhook's SSL client certificate file.	
webhook_ssl_crl	The complete path of the CRL file to validate webhook server certificate.	
webhook_ssl_ca_crt	The complete path to the webhook's SSL ca certificate file.	
allow_insecure_webhooks	When set to true, allow webhooks to call with insecure flag.	false

On 64 bit Windows systems, PEM registry entries are located in:

```
HKEY_LOCAL_MACHINE\Software\Wow6432Node\EnterpriseDB\PEM\agent
```

The registry contains the following entries:

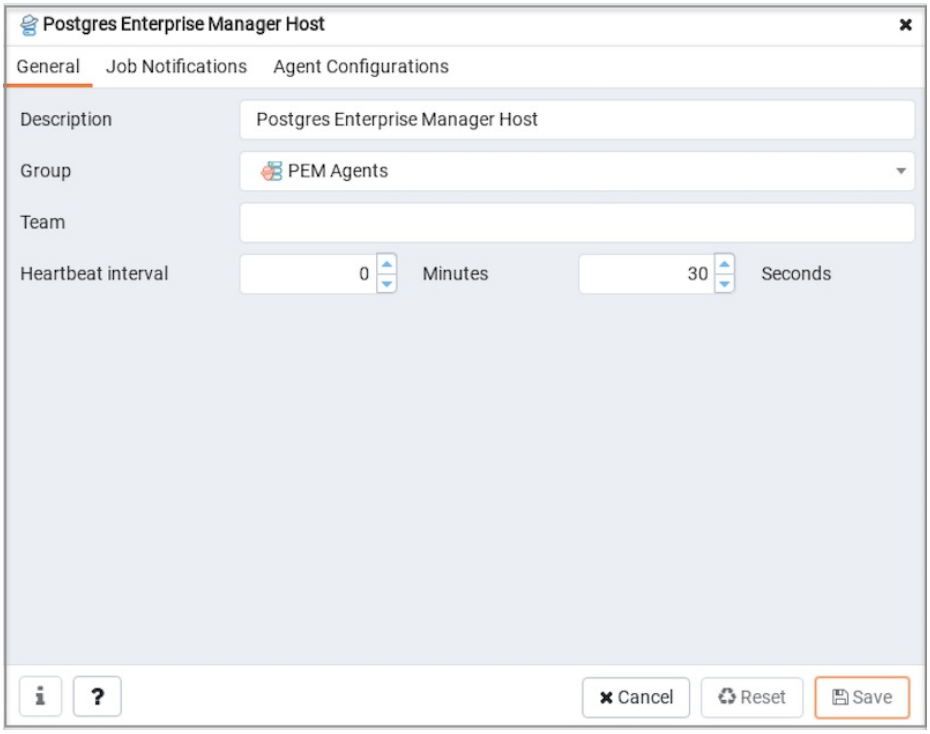
Parameter Name	Description	Default Value

Parameter Name	Description	Default Value
PEM_HOST	The IP address or hostname of the PEM server.	127.0.0.1.
PEM_PORT	The database server port to which the agent connects to communicate with the PEM server.	Port 5432.
AgentID	A unique identifier assigned to the PEM agent.	The first agent is '1', the second agent is '2', and so on.
AgentKeyPath	The complete path to the PEM agent's key file.	%APPDATA%\Roaming\pem\agent.key.
AgentCrtPath	The complete path to the PEM agent's certificate file.	%APPDATA%\Roaming\pem\agent.crt
AgentFlagDir	Used for HA support. Specifies the directory path checked for requests to take over monitoring another server. Requests are made in the form of a file in the specified flag directory.	Not set by default.
LogLevel	Log level specifies the type of event that will be written to the PEM log files.	warning
LongWait	The maximum length of time (in seconds) that the PEM agent will wait before attempting to connect to the PEM server if an initial connection attempt fails.	30 seconds
shortWait	The minimum length of time (in seconds) that the PEM agent will wait before checking which probes are next in the queue (waiting to run).	10 seconds
AlertThreads	The number of alert threads to be spawned by the agent.	Set to 1 for the agent that resides on the host of the PEM server; 0 for all other agents.
EnableSMTP	When set to true, the SMTP email feature is enabled.	true for PEM server host; false for all others.
EnableSNMP	When set to true, the SNMP trap feature is enabled.	true for PEM server host; false for all others.
EnableWebhook	When set to true, Webhook alerting is enabled.	true for PEM server host; false for all others.
MaxWebhookRetries	Set maximum number of times pemAgent should retry to call webhooks on failure.	Default 3.
ConnectTimeout	The max time in seconds (a decimal integer string) that the agent will wait for a connection.	Not set by default; if set to 0, the agent will wait indefinitely.

Parameter Name	Description	Default Value
AllowServerRestart	If set to TRUE, the agent can restart the database server that it monitors. Some PEM features may be enabled/disabled, depending on the value of this parameter.	true
MaxConnections	The maximum number of probe connections used by the connection throttler.	0 (an unlimited number)
ConnectionLifetime	Use ConnectionLifetime (or connection_lifetime) to specify the minimum number of seconds an open but idle connection is retained. This parameter is ignored if the value specified in MaxConnections is reached and a new connection (to a different database) is required to satisfy a waiting request.	By default, set to 0 (a connection is dropped when the connection is idle after the agent's processing loop).
AllowBatchProbes	If set to TRUE, the user will be able to create batch probes using the custom probes feature.	false
HeartbeatConnection	When set to TRUE, a dedicated connection is used for sending the heartbeats.	false
BatchScriptDir	Provide the path where script file (for alerting) will be stored.	/tmp
ConnectionCustomSetup	Use to provide SQL code that will be invoked when a new connection with a monitored server is made.	Not set by default.
ca_file	Provide the path where the CA certificate resides.	Not set by default.
AllowBatchJobSteps	If set to true,the batch/shell scripts will be executed using Administrator user account.	None
WebhookSSLKey	The complete path to the webhook's SSL client key file.	
WebhookSSLCrt	The complete path to the webhook's SSL client certificate file.	
WebhookSSLCrl	The complete path of the CRL file to validate webhook server certificate.	
WebhookSSLCaCrt	The complete path to the webhook's SSL ca certificate file.	
AllowInsecureWebhooks	When set to true, allow webhooks to call with insecure flag.	false

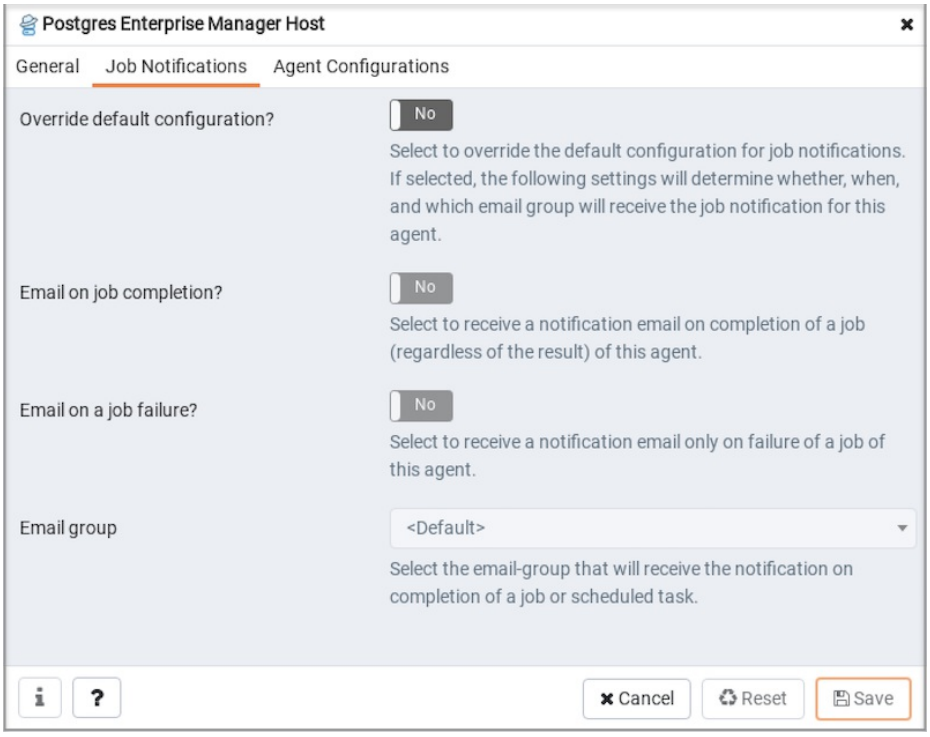
Agent Properties

The PEM Agent `Properties` dialog provides information about the PEM agent from which the dialog was opened; to open the dialog, right-click on an agent name in the PEM client tree control, and select `Properties` from the context menu.



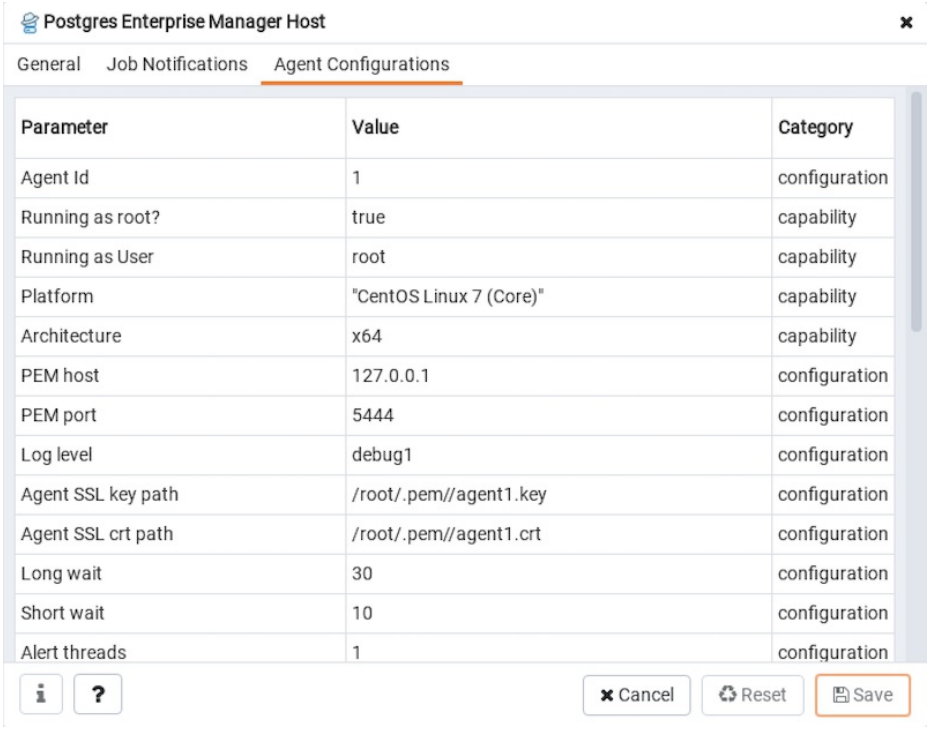
Use fields on the PEM Agent `Properties` dialog to review or modify information about the PEM agent:

- The `Description` field displays a modifiable description of the PEM agent. This description is displayed in the tree control of the PEM client.
- You can use groups to organize your servers and agents in the PEM client tree control. Use the `Group` drop-down listbox to select the group in which the agent will be displayed.
- Use the `Team` field to specify the name of the group role that should be able to access servers monitored by the agent; the servers monitored by this agent will be displayed in the PEM client tree control to connected team members. Please note that this is a convenience feature. The Team field does not provide true isolation, and should not be used for security purposes.
- The `Heartbeat interval` fields display the length of time that will elapse between reports from the PEM agent to the PEM server. Use the selectors next to the `Minutes` or `Seconds` fields to modify the interval.



Use the fields on the `Job Notifications` tab to configure the email notification settings on agent level:

- Use the `Override default configuration?` switch to specify if you want the agent level job notification settings to override the default job notification settings. If you select `Yes` for this switch, you can use the rest of the settings on this dialog to define when and to whom the job notifications should be sent. Please note that the rest of the settings on this dialog work only if you enable the `Override default configuration?` switch.
- Use the `Email on job completion?` switch to specify if the job notification should be sent on the successful job completion.
- Use the `Email on a job failure?` switch to specify if the job notification should be sent on the failure of a job.
- Use the `Email group` field to specify the email group to whom the job notification should be sent.



The `Agent Configurations` tab displays all the current configurations and capabilities of a agent.

- The `Parameter` column displays a list of parameters.
- The `Value` column displays the current value of the corresponding parameter.
- The `Category` column displays the category of the corresponding parameter; it can be either `configuration` or `capability`.