Effectively Managing Postgres in the Enterprise

An EnterpriseDB White Paper

For DBAs, Application Developers, and Enterprise Architects
July 2011
# Effectively Managing Postgres in the Enterprise

## Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>3</td>
</tr>
<tr>
<td>What is Postgres Enterprise Manager?</td>
<td>5</td>
</tr>
<tr>
<td>Why Postgres Enterprise Manager?</td>
<td>5</td>
</tr>
<tr>
<td>How is Postgres Enterprise Manager Architected?</td>
<td>6</td>
</tr>
<tr>
<td>Supported Platforms</td>
<td>7</td>
</tr>
<tr>
<td>Using the Management Console</td>
<td>8</td>
</tr>
<tr>
<td>Administration with Postgres Enterprise Manager</td>
<td>9</td>
</tr>
<tr>
<td>Starting and Stopping PostgreSQL Servers</td>
<td>9</td>
</tr>
<tr>
<td>Editing a Server’s Configuration</td>
<td>9</td>
</tr>
<tr>
<td>Managing Security</td>
<td>10</td>
</tr>
<tr>
<td>Managing Storage</td>
<td>11</td>
</tr>
<tr>
<td>Creating and Maintaining Databases and Objects</td>
<td>11</td>
</tr>
<tr>
<td>Performance Management</td>
<td>12</td>
</tr>
<tr>
<td>Diagnosing Postgres Performance</td>
<td>13</td>
</tr>
<tr>
<td>Viewing and Responding to Alerts</td>
<td>14</td>
</tr>
<tr>
<td>Customizing Monitored Servers and Alerts</td>
<td>15</td>
</tr>
<tr>
<td>Capacity Planning</td>
<td>16</td>
</tr>
<tr>
<td>Performing Trend Analysis</td>
<td>17</td>
</tr>
<tr>
<td>Forecasting Future Trends</td>
<td>18</td>
</tr>
<tr>
<td>Selecting Output Report Formats</td>
<td>19</td>
</tr>
<tr>
<td>SQL Performance Management</td>
<td>19</td>
</tr>
<tr>
<td>SQL Development Interface</td>
<td>19</td>
</tr>
<tr>
<td>Profiling and Analyzing SQL Workloads</td>
<td>20</td>
</tr>
<tr>
<td>Using the Index Advisor</td>
<td>23</td>
</tr>
<tr>
<td>Expert Best Practices Recommendations</td>
<td>23</td>
</tr>
<tr>
<td>Using the Postgres Expert Wizard</td>
<td>24</td>
</tr>
<tr>
<td>Reviewing Postgres Expert Recommendations</td>
<td>24</td>
</tr>
<tr>
<td>Conclusion</td>
<td>25</td>
</tr>
<tr>
<td>About EnterpriseDB</td>
<td>25</td>
</tr>
</tbody>
</table>

© Copyright 2011 EnterpriseDB Corporation. All rights reserved. EnterpriseDB and Postgres Plus are trademarks of EnterpriseDB Corporation. Other names may be trademarks of their respective owners. http://www.enterprisedb.com
Introduction

The data from Forrester Research shows that those who have to manage databases – whether they be database administrators (DBAs), system architects, or developers who have to perform many different jobs – are continually being pushed to do more. The latest findings from Forrester show that the typical DBA is responsible for an average of 35 databases (with many DBAs saying they have to manage lots more), and the trend is only moving upward:

Fortunately for DBAs, the manageability issue has been mitigated somewhat by the inclusion of database productivity/management tools that are many times provided by the database vendors themselves. Solutions such as Oracle Enterprise Manager from Oracle, SQL Server Management Studio from Microsoft, and others have become staples for DBAs who have to manage those particular databases.

Another trend noted by Forrester is the rise of open source databases in the enterprise. According to Forrester, nearly 75% of corporations and organizations will be using open source databases to power their production applications in just a few years. This represents a dramatic move to open source databases from just a few years ago when the primary users of such software were Web companies. Now, all sectors of the marketplace have joined ecommerce organizations – financial, medical, retail, telecommunications, education, etc., - in recognizing the maturity, capability, and financial benefits that come from using open source databases:
While the movement to open source databases has brought many different benefits to those that have adopted them, they also carry the same management burden as proprietary databases do. And while proprietary database vendors are recognized for providing enterprise-class management tools for DBAs to handle many different database servers at once across their organizations, the same can’t be said for open source database vendors.

This isn’t to say that tools do not exist to develop against and administer open source databases such as PostgreSQL and MySQL. There are certainly products that exist from the open source database communities and various third-party software vendors that work with open source databases. However, what has been lacking is the same type of enterprise-class management ability found in proprietary products such as Oracle Enterprise Manager.

Recognizing this issue, EnterpriseDB has introduced the first enterprise-architected management tool for DBAs who are looking to widely adopt Postgres in their enterprise and desire the same type of management capabilities they get from tools that are included from other database vendors that they work with.

The rest of this document describes this solution – Postgres Enterprise Manager – in detail and focuses on how data management professionals such as yourself will benefit from the enterprise-class capabilities supplied by the tool.
What is Postgres Enterprise Manager?

Postgres Enterprise Manager is an enterprise management tool designed to assist database administrators, system architects, and performance analysts in administering, monitoring, and tuning PostgreSQL and EnterpriseDB Postgres Plus database servers. Postgres Enterprise Manager has been architected to manage and monitor anywhere from a handful of databases to hundreds of servers all from a single console, which allows you to have complete remote control over all aspects of your databases.

Why Postgres Enterprise Manager?

Postgres Enterprise Manager provides a number of benefits not found in any other Postgres management tool. The top reasons why Postgres Enterprise Manager is the best solution for managing your database servers include the following:

1. **Management En-Mass Design.** Postgres Enterprise Manager is designed for enterprise database management and is built to tackle the management of hundreds 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.

2. **Distributed Architecture.** Postgres Enterprise Manager is architected in a way that maximizes both the statistical information gathered from each managed server as well as the capability to carry out operations remotely on machines regardless of operating system platform.

3. **Graphical Administration.** All aspects of database administration can be carried out via Postgres Enterprise Manager in a visual manner. Everything from server startup and shutdown, configuration management, storage and security control, object creation, performance management, and more can be handled from a single console.

4. **Full SQL IDE.** Postgres Enterprise Manager contains a robust SQL integrated development environment that provides everything for ad-hoc SQL querying and stored procedure/function development, including a graphical debugger.

5. **Enterprise Performance Monitoring.** Postgres Enterprise Manager 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.

6. **Proactive Alert Management.** Postgres Enterprise Manager ships out-of-the-box with the ability to create performance thresholds for each key area (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.

7. **Simplified Capacity Planning.** All key performance-related statistics are automatically collected and retained for a specified period of time in Postgres Enterprise Manager’s repository. The Capacity Manager component of the tool 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.

8. **SQL Workload Profiling.** Postgres Enterprise Manager contains a SQL profiling component 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 and includes filtering by user and database. Captured SQL statements can then be viewed by various performance criteria so poorly running SQL can easily be identified and tuned. SQL statements can also be fed into an Index Advisor on Postgres Plus Advanced Server that analyzes each statement and makes recommendations on new indexes that should be created to help performance.

9. **Expert Database Analysis.** Postgres Enterprise Manager contains a component called the Postgres Expert that 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.

10. **Wide Platform Support.** Postgres Enterprise Manager supports most major Linux, Windows, and Solaris platforms.

**How is Postgres Enterprise Manager Architected?**

Postgres Enterprise Manager is architected in a distributed fashion and contains the following three components:

1. Postgres Enterprise Manager Agent – responsible for performing tasks on each managed machine and collecting statistics for the database server and operating system.
2. Postgres Enterprise Manager Server – responsible for a variety of administration functions, receiving information from all agents, and maintaining information in its repository.
3. Postgres Enterprise Manager Client – the user console from which all operations are carried out (e.g. database administration, viewing performance information, etc.)
Supported Platforms

At present, Postgres Enterprise Manager supports the following platforms:

Postgres Enterprise Manager Agent:

- Windows (32 and 64bit)
- Linux (32 and 64bit)
- Solaris

Postgres Enterprise Manager Server:

- Windows (32 and 64bit)
- Linux (32 and 64bit)

Postgres Enterprise Manager Client:

- Windows (32 and 64bit)
- Linux (32 and 64bit)

As for supported versions of PostgreSQL, Postgres Enterprise Manager can manage and monitor PostgreSQL versions 8.2 and higher, along with Postgres Plus Advanced Server 8.3r2 and higher.

The SQL Profiling component of Postgres Enterprise Manager works on versions 9.0 and above of PostgreSQL and Postgres Plus Advanced Server.
Using the Management Console

As previously stated, Postgres Enterprise Manager allows you to manage all your database servers from one native client console:

Postgres Enterprise Manager uses a standard Explorer tree to connect to and navigate the contents of all managed servers. A main menu provides easy access to various tasks, and is context sensitive so only possible tasks for selected objects in the Explorer tree will be active. A graphical toolbar provides quick access to the most commonly used tasks and utilities.

The right hand portion of the client interface is tabbed in nature much like popular Web browsers. It is used to communicate various details for selected objects in the Explorer tree, as well as display performance information for selected servers and show reports for things like capacity planning analysis and more. Just like most Web browsers, you can open multiple tabs for different views, close tabs when you’d like, and use back/forward toolbar buttons to move backwards and forwards in the various performance monitoring views that are presented within a single tab.

Note that some utilities and interfaces in Postgres Enterprise Manager do not run within the main interface, but instead are presented in a distinct, standalone fashion. These include interfaces such as the SQL IDE and the SQL Profiler.
Administration with Postgres Enterprise Manager

Naturally, the core of Postgres Enterprise Manager revolves around administering Postgres servers. This means you can use Postgres Enterprise Manager to start/stop, configure, secure, handle storage, create objects, and carry out all standard administration duties for your Postgres databases.

The sections that follow touch on a number of these areas to highlight Postgres Enterprise Manager’s administration capabilities.

Starting and Stopping PostgreSQL Servers

Postgres Enterprise Manager allows you to graphically start up and shutdown your database servers/instances that are running remotely on other machines regardless of platform (e.g. Linux, Windows, Solaris, etc.) To carry out these operations, a database server must be configured to allow for remote startup/shutdown management.

Starting and stopping a server is as easy as choosing an option from either the main menu or the right mouse menu that becomes available when clicking on any server:

Note that currently, Postgres Enterprise Manager only supports the fast shutdown option of the database server.

Editing a Server’s Configuration

You can visually edit a remote Postgres’ main configuration file, as well as its security configuration file, through Postgres Enterprise Manager:
The Configuration Editor displays the values for the currently running server and allows you to double-click on any of the parameters to edit them. Once you have made the desired changes, you can save the file back to the remote server.

Warning: invalid values for parameters may result in your Postgres server not being able to start the next time a shutdown/startup procedure is performed, so make sure you have supplied the correct type and value for each parameter you edit.

Once you have saved your configuration file, you can reload the configuration so the change is reflected in the running server. Note that some value changes are not dynamic and will not take effect unless the server is stopped and restarted.

Managing Security

Postgres Enterprise Manager provides a visual way to manage all the security aspects of your database servers. The three most common tasks are the creation/maintenance of logins, roles, and object permissions.

For every type of security job, visual editors in Postgres Enterprise Manager ensure that the operation is performed accurately and without error. For example, creating or modifying login roles is handled by clicking on the Login Roles node in the main Explorer tree and using the right mouse menu option to create a new login or modify an existing one.

Security privileges can be assigned or revoked easily as well depending on what you want to do. Each database object has a Privileges tab in its editor that allows you to quickly assign or remove permissions for that object. In addition, the tool contains a Grant Wizard (available when selecting a schema node in the Explorer tree) that allows you to manage many object permissions at once.
Managing Storage

Postgres Enterprise Manager allows you to visually manage the storage structures that are used to house table and index data. Tablespaces can be created or modified in a point-and-click fashion, and once created, you can assign tables and indexes to different tablespaces.

A tablespaces node is present in the Postgres Enterprise Manager Explorer tree that allows you to create and manage tablespaces. Also, the properties editor for tables and indexes allows you to select what tablespace you want to assign the table/index to.

Creating and Maintaining Databases and Objects

Postgres Enterprise Manager provides visual interfaces to create and manage databases as well as all the various objects that comprise a database (e.g. tables, indexes, stored procedures, etc.)

Creating a database is quite easy in Postgres Enterprise Manager: simply click on any managed server’s Database node and select the New Database… right mouse menu option.

Once a database has been defined, you can create objects for the new database. Postgres Enterprise Manager provides visual editors to create and maintain all supported objects: tables, indexes, stored procedures, functions, triggers, views, constraints, and more. Also, users of EnterpriseDB’s Postgres Plus Advanced Server can manage Oracle-compatible objects such as packages.

Each object can be found in the Explorer tree. Clicking on a particular node and either using the right-mouse menu or the top level menu will enable to perform all desired tasks.

For example, to create a table you can right-mouse on a table node, select New Table… and then a dialog appears that allows you to create a new table:
This same process is how Postgres Enterprise Manager handles the creation/editing of every object.

Performance Management

One of Postgres Enterprise Manager’s strengths is that it contains built-in capabilities for enterprise-wide performance monitoring of all managed servers. While you can certainly customize many aspects of the various performance monitoring aspects of Postgres Enterprise Manager, you can also simply take the recommended defaults that come out-of-the-box with the product. This means that all you have to do to effectively monitor your database servers is merely install an agent on each machine you want to manage, register each server with Postgres Enterprise Manager, and everything else is done for you.
Diagnosing Postgres Performance

One of the toughest challenges for DBAs that have to manage many database servers is gaining an understanding of how their entire database ‘farm’ is performing as a whole. In short, DBAs need to know what’s up, what’s down, what fires are either occurring or about to occur, and where they need to spend their time. Postgres Enterprise Manager is designed to answer these very questions.

Postgres Enterprise Manager presents performance statistics through a number of different monitoring/performance pages that are navigated in Web Browser fashion. Performance data is displayed in summary views (e.g. status of all monitored servers), by individual server, database, and down to various object levels so you can get as much or as little information that you need at the moment.

To help you get an understanding of the general status of all the database servers you are responsible for, Postgres Enterprise Manager provides the Global Overview page that tells you, at a glance, what outages are currently being experienced, the general user traffic each server is undergoing, and which servers have issues that require your attention:

Once you’ve gained an understanding of what servers may need some analysis, you can utilize Postgres Enterprise Manager’s many monitoring and performance views that drill down into all aspects of your server’s performance. Performance views that you can navigate between include the following:

- Server – provides general performance information about the overall operations of a selected Postgres server
Effectively Managing Postgres in the Enterprise

- Database – displays database-wide performance statistics for a selected database
- Memory – supplies statistics concerning various memory-related metrics for the Postgres server
- I/O – shows I/O activity across various areas such as object DML activity, log operations and more
- Storage – displays space-related metrics for tablespaces and objects for a selected database
- Objects – provides performance details on tables/indexes of a selected database
- User Activity – shows connection information such as what users are logged on, what activity they are engaged in, locks, and more
- Operating System – supplies information regarding the performance of the underlying machine’s operating system
- Wait Activity – for EnterpriseDB’s Postgres Plus Advanced Server, a number of views are provided that show both system and session wait information

Each performance view is presented in Postgres Enterprise Manager’s tabbed interface, which is defaulted on the right hand side of the tool:

Once you invoke an initial performance view, you can switch to other views within the same tab. At the top of the tabbed view, and to the left, there will be a series of other monitoring view options presented that you can choose from. Choosing another view will replace the existing view in the same way as what happens in a Web Browser. You can scroll backward and forward through views in a tab using the Browser Back and Forward buttons in the main toolbar. You can also refresh the current view by clicking on the Refresh toolbar option.

Viewing and Responding to Alerts

Postgres Enterprise Manager continually monitors all the servers you designate and checks various performance metrics against a set of recommended thresholds that constitute “good” or acceptable performance for each statistic. Any deviation from those thresholds results in an alert being issued.

Alerts communicate the fact that conditions in one or more monitored servers require your attention. You can view alert information in a number of places inside Postgres Enterprise Manager:
• The Global Overview pages contains a count of all alerts that have occurred, along with a breakdown of total alerts by monitored server and a listing of the most recent alerts that have occurred.
• The Alerts Dashboard page displays summarized statistics for all alerts that have occurred across your servers as well as a detailed listing of each alert that has been identified.
• In addition, when there is an alert in an active state, an “!” icon is displayed at the right-hand end of the status bar of the main window, which flashes periodically to draw attention to itself. This can be clicked to jump to the global level Alerts Dashboard.

Customizing Monitored Servers and Alerts

Postgres Enterprise Manager provides a few recommended defaults for monitoring all aspects of your PostgreSQL servers, however you can customize how and when each server, database, and various objects within each database are monitored.

You can change a number of the properties for things such as how often a certain metric is collected, how long its information is retained for historical reporting purposes, and whether the metric is monitored at all. Postgres Enterprise Manager gives you very granular control over your alerts so you can define exactly what you want on the various objects you select.
Capacity Planning

One aspect of database administration that all DBAs know they need to do, but few actually do because of the complexity involved, is capacity planning. Capacity planning helps DBAs by providing answers to questions like:

- How much storage will my database need six months from now?
- How fast is my database growing?
- What objects are responsible for the growth in my database?
- Will my server be able to support another database instance?
- Is the performance of my database getting better, staying the same, or getting worse?

Capacity planning for databases typically involves two things:

1. Historical trend analysis, which entails viewing selected database statistics over various time periods so that trends can easily be spotted.
2. Forecasting, which involves using historical statistical information and projecting what various statistics (e.g. a database’s size) will be in the future.

Postgres Enterprise Manager contains built-in capabilities for performing database capacity planning so you can benefit from both historical and what’s-coming analysis without any of the setup and configuration pain normally associated with it.
Performing Trend Analysis

Postgres Enterprise Manager automatically collects (out-of-the-box) statistics across a wide range of areas including storage, memory, I/O, and more, and stores them in its metadata repository. Of course, you have full control over what and how often data is collected, but you can also take the product’s defaults and have the recommended statistics gathered for you automatically.

This means that most of the hard part involved with capacity planning operations – the automatic data collection piece – is transparently handled for you. All that remains is to use Postgres Enterprise Manager’s Capacity Manager interface to build desired trend analysis and forecasting reports:

After you have decided on what metrics to analyze, you can then determine the timeframe over which the analysis will be performed. Once you’re satisfied with your metric and timeframe choices, you can then tell Capacity Manager to generate your requested report:
Forecasting Future Trends

Capacity Manager lets you easily forecast future trends using historically collected metrics. To create forecasting reports, all that you need to do once you have chosen your desired metrics is either:

1. Select an end time period whose date is in the future
2. Select a threshold that you would like to see the report generated up until (e.g. for a metric such as database size, you might choose to see when a database will exceed one terabyte in storage)
Selecting Output Report Formats

Capacity Manager provides a number of options for creating analysis reports. First, Capacity Manager lets you either plot multiple statistics on one graph or produce a separate graph for each distinct metric.

Next, Capacity manager lets you create both graphical and tabular reports for historical trend analysis and future forecasts analysis reports. This lets you see graphical representations of your data as well as text.

Finally, you can determine how and where your reports are displayed – either in a new or existing tab within the Postgres Enterprise Manager interface or to a file that is written to your client workstation.

SQL Performance Management

Most RDBMS experts agree that inefficient SQL is the #1 cause of most database performance problems. The challenge for DBAs and developers is coding optimized SQL (either in standalone queries or objects such as stored procedures and functions), and then in production environments, finding the worst running SQL in large and complex systems and optimizing it for better performance.

Postgres Enterprise Manager supplies a number of tools and utilities to help you write proper SQL code as well as troubleshoot and fix existing systems that may be experiencing poor performance due to un-optimized SQL queries.

SQL Development Interface

Both DBAs and developers spend a lot of their time issuing ad-hoc SQL statements against their databases, modifying SQL code, debugging complex stored procedures, and troubleshooting slow running SQL. Postgres Enterprise Manager provides a very feature-rich SQL IDE that lets you do everything just mentioned in an intuitive and graphical manner.
With the Postgres Enterprise Manager’s SQL IDE, you can manually enter in SQL queries, graphically create and execute SQL statements from dragging and dropping objects onto a visual palette, view EXPLAIN plans for queries, debug stored procedures, and perform all the other normal tasks associated with SQL development.

Profiling and Analyzing SQL Workloads

Postgres Enterprise Manager provides the SQL Profiler component to assist in both finding and tuning poorly running SQL code. Users of Microsoft SQL Server’s Profiler will find Postgres Enterprise Manager’s SQL Profiler very similar in operation and capabilities.

SQL Profiler uses what is called a “SQL Trace” to identify a particular SQL workload that you have captured and want to analyze. There are two main ways to work with SQL traces within SQL Profiler:

1. Start a new trace
2. Open a saved trace
SQL Profiler allows you to filter what SQL statements are captured by user account and by database. You can choose to either limit your trace or capture every SQL statement sent by all users against all databases.

You can also choose to begin capturing SQL immediately in an ad-hoc fashion (i.e. you manually indicate to SQL Profiler when to stop the trace), or you can schedule the trace to run at a later time. Scheduling a trace is particularly beneficial if you want to capture a SQL workload when you won’t be present.

When you start a new trace and begin to view what has been collected, SQL Profiler will present the main window of the tool, which is used to analyze trace output. The SQL Profiler trace viewer is broken up into three distinct sections:

1. The top most section displays SQL statements collected in the trace
2. The lower-left section displays the full SQL text and statistics for a statement in the upper section that has been highlighted
3. The lower-right section displays either a graphical or text-based EXPLAIN plan for a statement in the upper section that has been highlighted
SQL Profiler provides you with a number of features that help you find the worst running SQL on your servers:

- Many different performance statistics for each SQL statement are provided. Sorting data in the Trace Data section by any statistic is easy; just double-click on the column header and SQL Profiler will sort the data in that order. This allows you to find, for example, the longest running SQL statement very quickly.

- You can define filters on the trace output to further restrict what SQL statements are shown. You can construct a filter so that you only see the SQL statements that match your specific criteria, such as SQL statements that run longer than 60 seconds.

- In the Properties pane, you can view the full SQL statement and highlight/copy it out into a SQL IDE session for rework. You can also click on the Metrics tab and see a variety of statistics for the statement such as how many times it has been executed, the overall percentage of execution time vs. all other collected statements, and more.

- In the EXPLAIN pane, clicking on each graphical part of the graphical EXPLAIN plan shows various statistics for that part of the plan.

- You can export the trace data to another file format for further analysis.
Using the Index Advisor

In EnterpriseDB’s Postgres Plus Advanced Server 9.0 and above, a performance utility called the Index Advisor is included. The Index Advisor helps you by examining one or more SQL statements and making recommendations of new indexes that should be created on the underlying tables to improve SQL response time. The Index Advisor works on all DML (INSERT, UPDATE, DELETE) and SELECT statements.

Diagnostic output from the Index Advisor includes:

- Forecasted performance benefits from any new indexes
- Size of any new indexes
- Create DDL used for creating any new indexes

SQL Profiler integrates with the Index Advisor so you can easily submit captured SQL statements to it and view index recommendations (if any) from the utility.

Note, again, that the Index Advisor is only included in EnterpriseDB’s Postgres Plus Advanced Server, versions 9.0 and above.

Expert Best Practices Recommendations

If you’re new to Postgres, you may initially struggle with how best to set up your servers so they are properly configured from a resource, security, and design standpoint. Postgres Enterprise Manager provides expert advice on how best to configure your PostgreSQL servers for optimal performance, security, and more through the Postgres Expert component. Postgres Expert serves as an expert PostgreSQL “DBA in a box” by analyzing your servers for deviations in best practices across these areas:

1. Configuration and setup
2. Schema design
3. Security

Each analyzed area includes numerous best practice rules written by the database experts at EnterpriseDB. You can select which servers the Postgres Expert analyzes and then view reports that detail any best practice issues that require your attention.
Using the Postgres Expert Wizard

The Postgres Expert component displays the various areas it will analyze on the servers you desire:

![Postgres Expert Wizard](image)

Each "expert" in the Postgres Expert component contains a number of rules that you can choose to enforce/not enforce on your servers.

Once you have decided which experts and rules to run, you then can choose to analyze one or more servers at once on the next wizard panel. After you’ve selected the servers you’d like to check, the last wizard panel simply asks if you’d like to view the reports immediately or write them to a file for later analysis.

Reviewing Postgres Expert Recommendations

Postgres Expert produces an easily navigated report of all its findings (categorized by high, medium, and low severities) across all the servers you selected for analysis.

![Postgres Expert Report](image)
Effectively Managing Postgres in the Enterprise

The top contains a summary of Postgres Expert’s findings. Afterwards, each server that you selected for analysis is displayed along with the findings of each expert’s rules. Clicking on each rule displays the recommendation for that particular issue:

<table>
<thead>
<tr>
<th>Rule</th>
<th>Database</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check data and transaction log on same drive</td>
<td>-</td>
<td>High</td>
</tr>
<tr>
<td>Check for missing primary key</td>
<td>integer</td>
<td>Low</td>
</tr>
<tr>
<td>Check for missing foreign key indexes</td>
<td>int</td>
<td>Medium</td>
</tr>
</tbody>
</table>

Trigger: child table with no index on referencing columns

Recommended Values: Ensure columns of child tables in foreign key relationships are indexed

Description: Foreign Keys are used to define and enforce relationships between child and parent tables. The Foreign Key specifies that values in one or more columns of the child table must exist (in the same combination, if more than one column) in the referenced column(s) of the parent table. A unique index is required to be present on the referenced columns in the parent table. However, an index is not required, but it is generally advisable, on the referencing columns of the child table to allow cascading updates to the parent to be executed efficiently.

Current Values:
- role
- schema_name: public
- table_name: broker

Conclusion

With the continued rising importance of data in the enterprise, data management professionals constantly find themselves having to manage more databases, including open source databases. Whereas they routinely have other enterprise-class management tools to help them with their proprietary databases, the same has not been true for open source databases.

That has now changed with the introduction of EnterpriseDB’s Postgres Enterprise Manager. The goal of Postgres Enterprise Manager is to provide a solution that allows you to intelligently manage all your database servers across your enterprise from a single console. To meet this objective, Postgres Enterprise Manager supplies you with all the core features and functionality needed for visual database administration, as well as a number of advanced components that assist you in managing the performance and design of your database servers.

For more information about Postgres Enterprise Manager, please visit the EnterpriseDB Web site (www.enterprisedb.com) where you will find Postgres Enterprise Manager’s online documentation as well as downloads, and other tutorials and educational aids.

About EnterpriseDB

EnterpriseDB is the enterprise PostgreSQL company, providing products and services worldwide that are based on and support PostgreSQL, the world's most advanced open source database. EnterpriseDB’s Postgres Plus products are ideally suited for transaction-intensive applications requiring superior performance, massive scalability, and compatibility with proprietary database products. Postgres Plus products provide an economical open source alternative or complement to proprietary databases without sacrificing features or quality.

EnterpriseDB understands that adopting a new database is not a trivial task. You have lots of questions needing answers, schedules and budgets to keep, and processes to follow. We have...
helped thousands of organizations like yours through the steps to investigate, evaluate, prove, develop, and deploy their PostgreSQL solutions.

To make your work easier and faster, we have special self-service sections on our website dedicated to assisting you in each of the steps. Additionally, visit http://www.enterprisedb.com/solutions/stages/overview.do.

- **Getting Started** – access to free downloads, installation guides, demos, starter tutorials, and more to help get familiar with the database.
- **Evaluations and Pilots** – learn how PostgreSQL has helped hundreds of Oracle users cut costs and MySQL users improve operations.
- **Development** – EnterpriseDB employs more PostgreSQL experts, developers and community members and than any other company, and offers key application development resources.
- **Deployment** – information on how to scale a PostgreSQL application, add Qualities of Service (QoS) like high availability or security, or get a health check.

If you would like to discuss training, consulting, or enterprise support options, please contact EnterpriseDB directly. EnterpriseDB has offices in North America, Europe, and Asia. The company was founded in 2004 and is headquartered in Bedford, MA. For more information, please visit http://www.enterprisedb.com.

**Sales Inquiries:**

sales-us@enterprisedb.com (US)
+1 781-357-3390 or 1-877-377-4352 (US Only)
sales-intl@enterprisedb.com (Intl)

**General Inquiries:**

info@enterprisedb.com
info.asiapacific@enterprisedb.com (APAC)
info.emea@enterprisedb.com (EMEA)