Tech Note

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The High Performance DBA Series

Best Practices for Managing Multiple Database Platforms for Performance & Availability

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INTRODUCTION

Database administrators (DBAs) and developers have become significantly busier in recent years, as data rates increase exponentially and companies incorporate multiple database platforms into their IT infrastructure. There is a clear trend toward cross platform database development, and DBAs must cope with complex, heterogeneous database environments, multiple platforms, multiple *versions* of platforms, and numerous database instances.

According to Forrester Research, 90% of all enterprises have more than one database management system in place. Meanwhile, data is flooding these systems at an average annual growth rate of 30%, and large, critical business applications are growing by 52% on average (see Figure 1). As a result, today's DBA manages a terabyte of data or more.
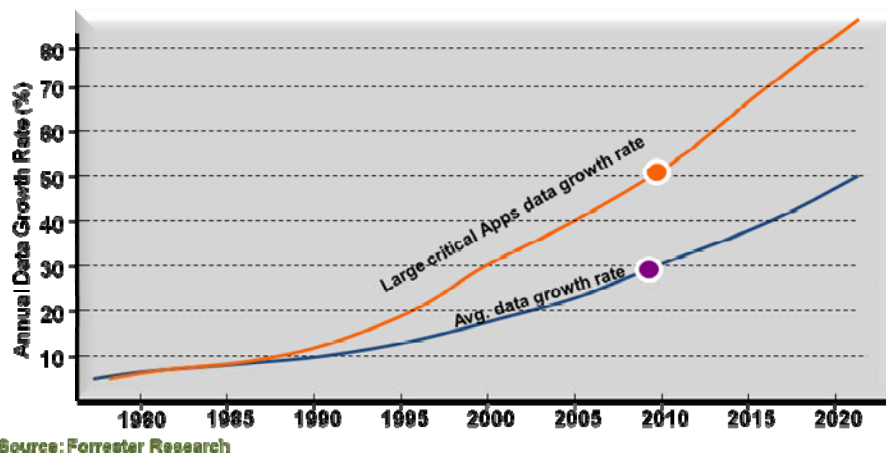

Figure 1. Current average data growth rate.

According to the same report, DBAs must deliver improved performance and availability while handling this massive data volume with increasingly fewer resources. In fact, growth of the number of database instances is off the charts, and is projected to increase to over 50 per DBA by the year 2015. The current ration is 35:1 (see Figure 2). Imagine being the sole DBA responsible for 35 database instances and tasked with being proficient in 3-4 different database management systems. To add to the pressure, a single DBA must meet the needs of 6-10 database developers, all requesting changes, updates or other business-critical actions.
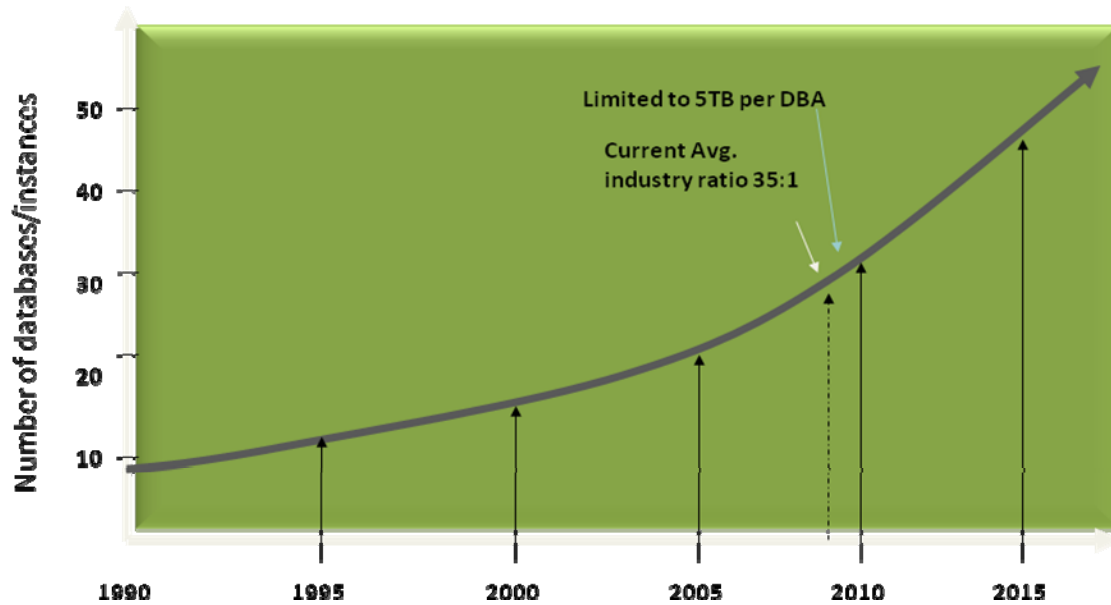
Figure 2. The ratio of DBAs to database instances is increasing rapidly, and is projected to reach 50:1 by 2015.

What DBAs need is enhanced manageability, change management and automation—and the right tools to simplify, streamline and reduce the complexity of day-to-day tasks. Without such tools, it will be impossible for DBAs to handle the increasing pressure of new business requirements and limited resources, and, ultimately, performance and quality will suffer.

This paper takes an in-depth look at some of the features and capabilities of Embarcadero All Access tools, including Rapid SQL, Change Manager and DB Optimizer, and how they can help ease the pressure on DBAs to handle more than their share.

CHALLENGES OF CROSS-PLATFORM DATABASE DEVELOPMENT

Both DBAs and database developers alike face serious challenges as companies strive to store and manage more and more data. First, a lack of the appropriate skill sets can slow the process of assimilating a new database platform, costing companies time and money. For example, acquisitions often introduce new platforms to existing IT infrastructures, and DBAs may be tasked with getting up to speed quickly even though they have limited knowledge about the new platform. Across multiple DBAs and developers, there is often a lack of consistent administration procedures, which can also impact productivity. These issues lead to longer resolution times when there are issues, and ultimately, a negative impact on service-level agreements. For example, if an administrator finds an issue, it must be handed over to a developer for repair. As developers struggle to become familiar with a new platform, it may take days to identify and fix the problem.

The challenges of cross-platform database development and management can lead to significantly increased costs, as well, as IT departments rush to hire new developers to support unfamiliar platforms.

Unfortunately, the days of working within a single platform are over; DBAs and developers must adapt. They need to arm themselves with the right tools and procedures to be able to support multiple platforms and work efficiently despite the big challenges they face. They need to find and implement tools that can take on some of the heavy lifting and make working in and between multiple database platforms easy and seamless. Specifically, DBAs and developers must have tools that provide integrated SQL development, comprehensive change management and the ability to optimize code for production.

- **Integrated SQL development**—DBAs spend most of their time writing SQL queries, modifying procedure and writing code. They need tools that provide strong heterogeneous support for SQL development, so that even if they're unfamiliar with the platform for which they're developing, they can work productively within a familiar UI. A unified solution that automates the application of configuration standards and templates in the various platforms and can perform compliance checks will boost productivity.

- **Change management**-- During migrations, updates and tuning, changes are often made to the database environment. Tracking those changes is essential for compliance. Additionally, changes can introduce performance problems or more serious issues, and being able to compare configuration states can help identify what changes caused what problems. A quick glance at configuration settings of a database install or structure changes to objects like indices or procedures can reveal where things went wrong, and help the developer pinpoint what needs to be changed to restore the environment to its optimal state. A solution that provides this type of snapshot visibility can save the DBAs and developers hours of tedious work and speed time to repair.

- **Database optimization**--The credibility of a DBA or developer is on the line. Although they may be meeting requirements with stored procedure and code, they must ensure the database is also performing well. When developers are familiar with the platform he's using, they know the tips and tricks to optimize code for the best possible performance. But on an unfamiliar platform, they need optimization tools to ensure that poor-performing code never reaches the production environment, where it is significantly more costly to correct. Key features of robust database optimization tools include the ability to perform wait-time analysis, create performance profiles, drill down into data and enter a tuning session with a click of the mouse. Tools that automate data masking or allow the creation of a subset of test data from the production environment enable fine-tuning prior to releasing code into production.

Embarcadero All-Access is one solution that provides all the capabilities necessary for integrated SQL development, change management and database optimization (see Figure 3). From within a single user interface, DBAs and developers have complete access to the tools they need to work with multiple database management systems (DBMSes), regardless of their background or expertise. Within Embarcadero All-Access are tools with ancillary

features and functions that provide deep support for development across multiple database platforms.
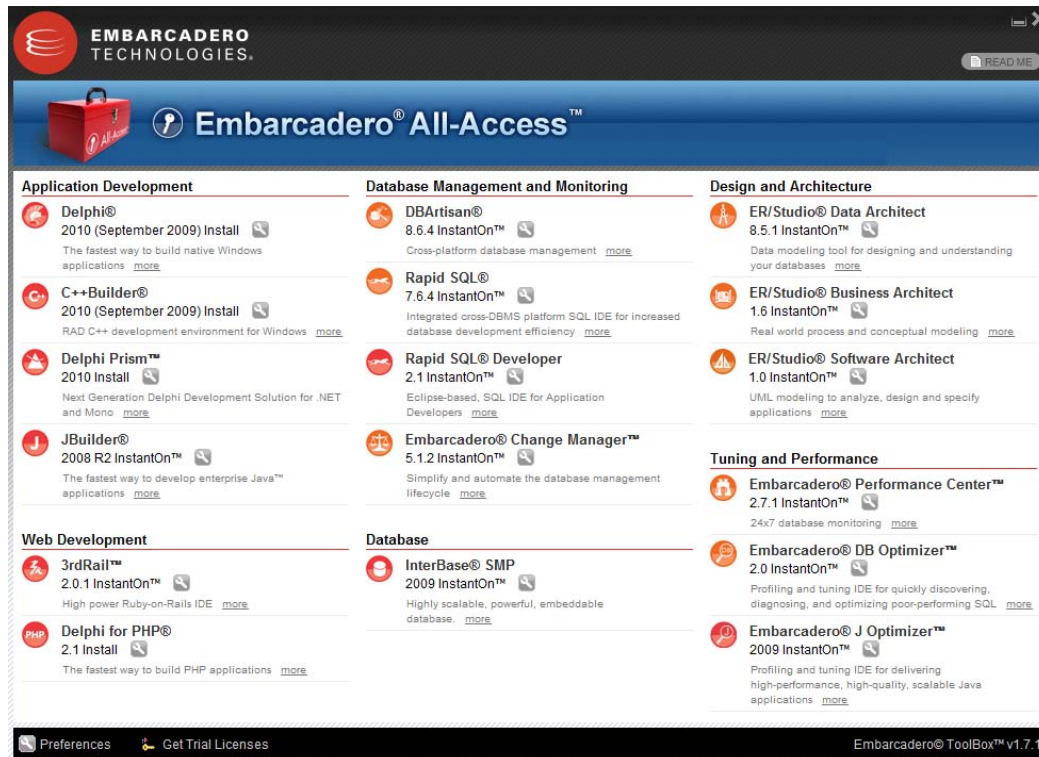

Figure 3. *Embarcadero All-Access provides fast access to critical tools and resources necessary for cross-platform database development and management from a single user interface.*

Let's take a closer look at some of the key features and functionality provided in Embarcadero All-Access that meet the increasingly complex and urgent needs of today's DBAs and database developers working in cross-platform environments.

EMBARCADERO RAPID SQL—INTEGRATED SQL DEVELOPMENT

Embarcadero Rapid SQL offers several features that ease the transition into the unfamiliar territory of cross-platform database development and management.

Heterogeneous platform support

Many DBAs work with outdated or inflexible tools that don't support the functionality they need, and they hope for the best. Often, they spend considerable time pouring over online documentation, trying to determine how to perform common tasks, such a creating a table, in a new environment. This has a tremendous impact on productivity and allows for human error. Rapid SQL provides a wizard approach that results in significant time-savings, automatically converting queries into the appropriate format for the target platform.

Depth of platform knowledge

Rapid SQL literally walks users through the steps and information they need, enabling them to select the appropriate options based on the rules of the target platform. For example, users can easily create tables, even if they don't know the right data fields and types. Rapid SQL automatically provides the correct data types so users can become efficient on a new platform very quickly.

Rich, familiar user interface

Database development and management tools must fit how the users works or have the capability to be configured as such. Rapid SQL offers a single user interface, no matter what the target platform. users don't need to familiarize themselves with a new UI and can start being productive immediately. This is particularly important when bringing on new talent to take over projects. A single UI can cut down on ramp-up times as well as training costs.

Comprehensive tools menu

Sometimes developers need access to other tools while writing code. Rapid SQL links to a number of built-in tools to streamline code development, fine-tuning and management. For example, a user can access tools with a single click from the Tools menu within the interface to search within files or across a database and find very granular data, such as a table or a procedure. He can execute scripts and files, schedule scripts and view the visual differences between two files or database objects for on-the-fly comparisons. Rapid SQL also provides quick links to other software like Performance Center and editing tools. This feature is customizable.

Streamlines coding

With a new platform, it's challenging enough to learn the constructs of the procedural language. But to understand the relationships between data structures and how to form a query is even more challenging. Rapid SQL's graphical query builder helps the user understand relationships between foreign and primary keys and enables drag and drop of those relationships into the SQL window. The meaning is defined in the metadata and is brought into the query builder automatically, helping to easily and quickly construct an effective query. Once constructed, the query can then be validated, copied and saved. This level of automation allows the user to focus on the procedural portion of writing code instead of worrying about constructing the query properly. The tool also provides validation and error checking as code is entered, saving even more time.

Code Organization and debugging

In the Explorer, Rapid SQL enables users to organize data sources by platform and categorize them for easy retrieval. The Bookmark feature saves users time by linking users to the resources they need with a single click. This is very helpful when working in an unfamiliar platform. Filters in Rapid SQL help to remove the "noise" and enable users to focus on only relevant information. Rapid SQL also lets users initialize and create new database projects easily and reverse engineers all the code, seamlessly integrating objects, saved code and version control solutions. For example, a user can connect to an Oracle database and simply select the procedures he wants to execute. Rapid SQL extracts those procedures, applies them to the new project and automatically checks in changes to whatever version control

solution is being used. Another important feature is the ability to debug code prior to production. This saves considerable time, as bad code never makes it past the tuning stage, and developers don't need to spend time fixing it.

Code reuse and application of standards
Rapid SQL enables users to reuse code and avoid reinventing code. Users can define "favorites," or pieces of code and procedures that they often use. They simply click on a favorite and it opens in the SQL window. This feature enables easy retrieval of code that is most often used. Users can also set up code templates, drop in comments or other data on-the-fly and without re-typing, or import and export settings, helping new users to get up to speed rapidly.

CONSIDERATIONS FOR CHOOSING AN EFFECTIVE SQL DEVELOPMENT TOOL

When selecting a comprehensive tool for SQL developing, consider the following:

- Does the tool provide a rich user interface?
- Does the tool have a comprehensive tools menu?
- How deep is the tool's knowledge of other platforms?
- Does the tool enable code organization and the application of standards for DB development?
- Can the streamline and improve coding?
- Does the solution include a debugger?

CHANGE MANAGEMENT

An effective change management tool can also have significant impact a DBA's ability to effectively manage and optimize the database environment. During migrations, updates and tuning, changes are often made. Tracking those changes is essential for compliance. Additionally, changes can introduce performance problems or more serious issues, and being able to compare configuration states can help identify what changes caused what problems. A quick glance at configuration settings of a database install or structure changes to objects like indices or procedures can reveal where things went wrong, and pinpoint what needs to be changed to restore the environment to its optimal state. A solution that provides this type of snapshot visibility can save the DBA hours of tedious work and speed time to repair.

Given the cross-platform nature of the development environment in today's data centers, change management tools, like SQL development tools, must be heterogeneous and be able to seamlessly integrate with numerous database environments, while providing simplicity of use through a single user interface.

Embarcadero® DB Change Manager™ XE enables users to compare, synchronize and audit capabilities as well as track and report on changes from a single UI (see Figure 4). Users can

pinpoint performance problems that result from checked in changes to data, configuration or other elements of the environment. By comparing a live database to a schema or configuration "snapshots," administrators can quickly identify changes and correct problems before pushing the code into production. This helps to ensure compliance with policies and standards as well as optimal performance at all times.
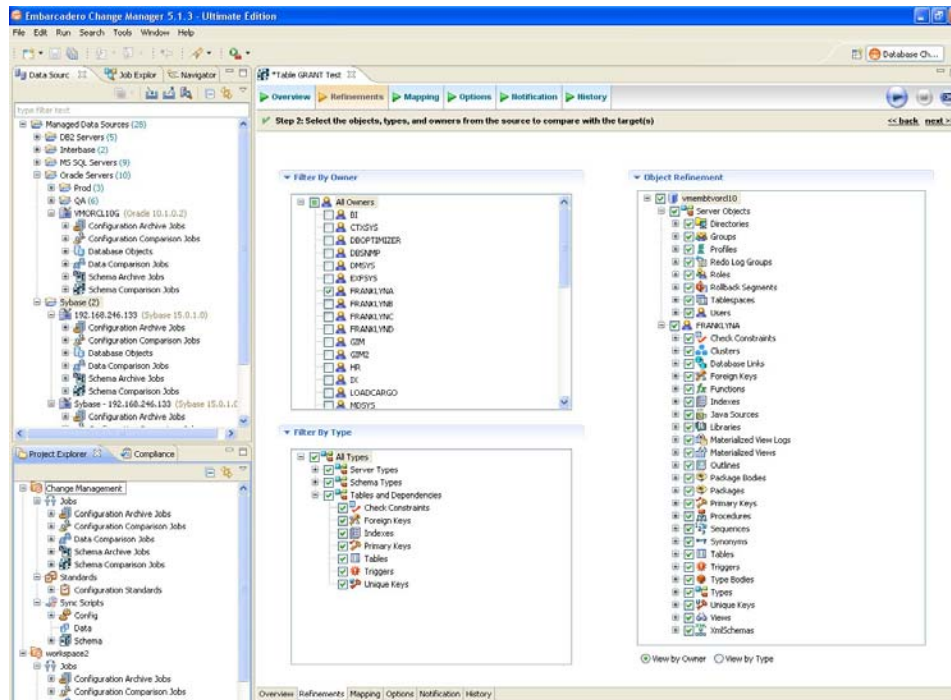

Figure 4. *Embarcadero DB Change Manager XE helps database administrators and developers simplify, automate and report on database changes to streamline development cycles, ensuring availability, performance and compliance.*

DB Manager lets users reproduce processes, such as running nightly checks that identify serious issues, and notifies DBAs first thing in the morning so they can address the issues promptly. Users can capture objects to set a baseline for performance, and the tool automatically compares and changes to that baseline. DBAs receive alerts about what's causing non-compliance, and can immediately change the baseline or revert changes. They can also specify which users receive change notifications and how they receive them. These features help to mitigate the impact of changes, particularly ones that may adversely affect performance. Change Manager can also be configured to run automatically according to a desired schedule using a command-line API.

PERFORMANCE MANAGEMENT

Obviously, it's less expensive to find and fix a problem during development, before code is put into production. Having tools that enable DBAs to track and troubleshoot problems prior to releasing code to production can save companies significant time and money. Although these tasks—tracking and identifying potential issues in the code—can be done manually, a manual approach is unproductive and tedious. A tool that can automate this process is

essential when a single DBA is responsible for multiple database instances and multiple platforms.

Embarcadero® DB Optimizer™ XE is a heterogeneous tool that maximizes database and application performance by quickly discovering, diagnosing and optimizing poor-performing SQL—before it goes into production. DBAs can use the tool to create visual profiles of key metrics, such as CPU, I/O and wait times, inside the database. Using these visual aids, DB Optimizer relates resource utilization to specific queries as they're being written, helping users to see and tune problematic SQL as it's being generated. This enables DBAs to check errors, debug code and execute fixes in real-time and helps to eliminate performance bottlenecks in production databases and applications (see Figure 5).
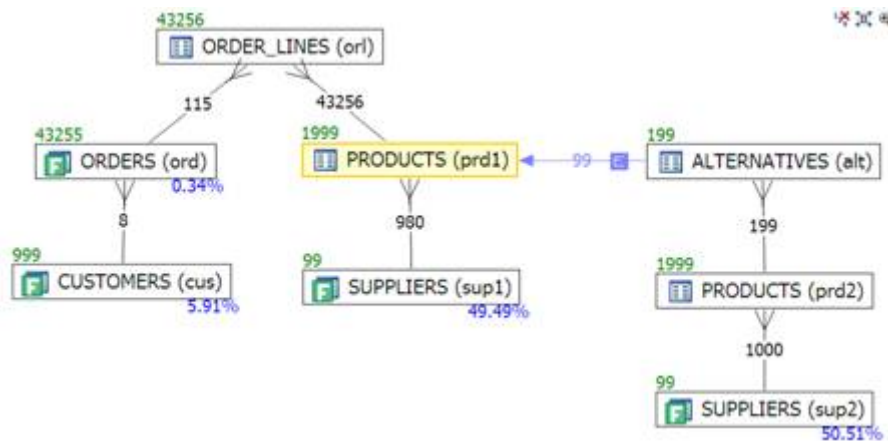

Figure 5. *Visual tuning diagrams in DB Optimizer are revolutionary to database optimization. They present a visual way to assess and fine-tune how an SQL query is formed and processed.*

Summary
In the cross-platform database development environments of today's overtaxed IT departments, the heat is on DBAs to find ways to be productive and efficient. This scenario is likely to become even more intense in the coming years. Tools that simplify and automate once-manual, laborious tasks can have a profound impact on a DBA's effectiveness, helping to mitigate rising costs while improving and optimizing the performance of an organization's databases. Embarcadero All-Access is one solution that has incorporated advanced capabilities to enable DBAs and database developers to handle expanding workloads with ease and efficiency, and increase their value to busy IT organizations.

EMBARCADERO XE DATABASE TOOLS

The Embarcadero® XE family of Database Tools provides DBAs with a range of solutions throughout their day, giving them a choice of tools in their arsenal to tackle any problem that comes their way. All major database platforms are supported in each tool from a single interface, including Oracle®, IBM® DB2, Sybase®, Microsoft® SQL Server, InterBase® SMP, MySQL®.

Embarcadero XE Database Tools include:
- Rapid SQL® XE – Write quality SQL faster with a full-featured SQL IDE.
- DBArtisan® XE – The industry's premier database administration tool.
- DB Change Manager XE – Simplify, automate and report on database changes.
- DB Optimizer XE – Prevent, find, monitor and fix performance issues via visual SQL profiling and tuning.
- ER/Studio® -- A powerful modeling and architecture solution that combines process, data, UML modeling and reporting in a multi-level design environment.

All of Embarcadero's XE products can be purchased as individual tools, or as part of Embarcadero All-Access XE. Both individual tools and All-Access XE include Embarcadero® ToolCloud™, which enables centralized license management and tool deployment while InstantOn™. InstanOn is a lightweight, zero-install client that lets DBAs run multiple versions of tools without conflicts and without the need for installation on local machines. DBAs and their teams can centrally provision tools, automatically receive updates, and access tools on demand inside the corporate firewall.

All-Access XE is a single, cost-effective license that provides access to all database tools from a single ToolBox, maximizing the DBA's productivity while reducing administrative and licensing costs.

ABOUT THE AUTHOR

Scott Walz has more than 15 years of experience in database development and serves as senior director of product management for Embarcadero Technologies. In this position, Scott oversees the direction of the company's database product family, while focusing on database development and administration products. Prior to joining Embarcadero four years ago, Scott served as development lead for Louisville Gas & Electric. He holds a bachelor's degree in computer information systems from Western Kentucky University.

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