Fusion: The New Frontier for Managing Oracle

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Executive overview

Consolidation of systems and process standardization is enabling IT to deliver greater services and higher availability to the business. Many companies, even those with limited budgets, are now reviewing new technologies and willing to invest if it enables more effective and efficient process standardization and management. Managing performance across the entire IT infrastructure is difficult as performance can be affected by multiple domains and environments of systems, networks, databases, and application servers. As a result, there is a growing need to improve the ability of IT to support existing applications as well in preparation for Oracle's next generation as part of Oracle's Fusion strategy.

Some areas within IT have difficulty maintaining or improving performance of existing applications because of increasingly complex environments. This problem compounds as they deploy new applications with shared Service Oriented Architecture (SOA) infrastructure. Instead of looking at the combination and interaction across infrastructure components, some are trying out-of-date client-server techniques in lieu of using point management utilities in hopes of a quick remedy. With multiple tiers and siloed point management the norm, IT historically has procured and over provisioned in an attempt to ensure service levels remain within targets as cross-domain processes. Previous attempts to create integrated management in some organizations were abandoned when political barriers were encountered. Many departments were told by their domain management that it was not a problem of theirs to resolve. With application services available over a wide variety of networks, including ones external to business, the practice of over provisioning cannot be applied to systems that are not assets of the company.

Network management is so fundamental to SOA providing access to internal and global services it has been compared to common electrical distribution and the term "Grid" applied. Just like power distribution, if similar converged and responsive management is not utilized, overall service blackouts could occur with even regional disruptions impacting the masses.

End-to-end performance management strategies are being chosen over the silo approach. Early adopters deploying SOA-based initiatives will consider the impact of performance across the tiers of IT infrastructure in concert versus the singular domain silo approach. There are those in IT that may be focusing on application coverage by platform or vendor unaware there is now technology available that be used for common management across multiple vendors. A differentiating factor with SOA applications is that services will be running in different business unit domains, or even on ones outside of the WAN and old practices may no longer be applicable.

IT organizations need to be thinking about process standardization across domains and how to improve the efficiency and effectiveness of their infrastructure management and IT investment. As IT organizations move toward improving service management and seek to align IT services with business objectives, there are opportunities to look for technologies that

enable resource visibility and optimization across application, server, and storage infrastructure.

Some organizations have deployed a sizable number of relational databases from multiple database vendors in support of current and planned business applications. As a greater number of databases are deployed, new releases become more complex causing databases to grow in size or usage. As a result, it becomes increasingly difficult and costly to manage those databases independently. While a "Best of Breed" technology may have filled the gap as an interim, lack of common services and infrastructure integration components within it, prevent its reusability or stability for a large enterprise.

In contrast, when companies faced similar challenges with system and network technologies, data centers and Network Operation Centers (NOCs) formed to centralize and leverage multi-vendor management technology. In this manner, a UNIX Systems Administrator could manage various UNIX systems (SUN Solaris, IBM AIX, HP Tru64, HPUX, etc). There was no longer the need to employ a different Network Administrator for each protocol or vendor switch technology used.

Significant accomplishment in technology for common database management across vendors and platforms is now available in the market. Similar to what was already none for networks and systems, companies are now rationalizing and initiating projects to now centralize this IT infrastructure component as part of their end to end performance strategy.

A major factor for a project of this undertaking is a firm understanding of the business requirements. This includes a review of existing systems as well as:

- Multi-vendor management capabilities
- Functional scalability for very large databases and the enterprise
- Integration for infrastructure coverage, correlation and problem response resolution

To manage complexity, there has to be the capability to get to the core of the problem. Understanding where applications are hitting the various tiers of the infrastructure, such as across the network, to systems and storage, to the database, all the way up through the application server and application tiers. Consolidating operations and enabling best practices towards automation enables increased business capabilities as well as controlling costs as business increases.

Managing Services Oriented Infrastructure for Fusion Composite Applications

A company may already own applications like Oracle eBusiness Suite, PeopleSoft, or Siebel, or already have existing in-house applications utilizing a variety of database vendors. The CIO wants to start leveraging "SOA" that's been in all the publications or deploy Fusion SOA applications after attending a recent Oracle OpenWorld executive track. While company developers and users may be excited to get it into production as soon as possible, SOA technology has higher application and service management loads that need to be considered

against the existing management infrastructure, as it may not be prepared to handle this increased load. Performance, scalability and management should not be an after thought or a problem to resolve after deployment. SOA applications bring new management challenges to IT that need to be understood and addressed with proper preparation.

Unlike Oracle applications like eBusiness Suite, SOA-based applications are seldom homogeneous. For example, a .NET service may call a J2EE service or request data from a Microsoft SQL Server, Oracle or DB2 database. While loosely coupled services provide benefits to others such as application developers, they increase complexity for IT in respect to infrastructure management. Based upon business demand, programmed logic may direct a service request to source over a network or to a system where you do not know the service level availability or capacity information. If the catalog order entry system starts to reference a new supplier's database because of a new marketing promotion, you don't want to just hope that their database can support the load, do you?

SOA-based applications value comes from the ability to cross internal system boundaries for information exchange via internal or public networks. With orchestration across tiers of systems, networks, application servers, databases and storage monitoring domains individually doesn't provide overall correlation of service interaction capability. Every added point of application communication service exchange increases the likelihood of problems occurring as well as increases complexity of performance management.

Performance problems in SOA application and middleware environments are broader and compounded by the number of service sources subscribed. Much like previous client-server application deployments, IT Managers need a performance management strategy for SOA based applications like Fusion, as past management methods or application vendor supplied utilities do not provide adequate coverage and visibility for effective SOA application infrastructure management.

Managing SOA database complexity

Lack of technology and process maturity has led some companies to consider outsourcing because process improvement appears too difficult. While this approach may have a short-term impact for a quarter or so; the reality is that every IT organization eventually must address improving process maturity as it is the only long-term means of lowering costs and managing the corporation's computing assets.

In a world of diverse computing, a majority of enterprises use multiple relational database management systems (RDBMS). Since each database may have its own set of management tools and in some cases limiting proprietary vendor specific functionality, it can be often difficult for database administrators to manage environments effectively — they must either learn and use multiple tools, or spend time and money on internal integration projects.

Prior to the availability of technology capable of managing databases from multiple vendors, you might rely on traditional or separate monitoring techniques for database availability and performance monitoring. For some in IT, this involved enabling their databases with Simple

Network Management Protocol (SNMP). However as database administrators removed or added objects to databases, each database monitoring configuration would have to be altered for the changes. Because this was such a laborious process, usually the portions of the database with the least usage were monitored, while the important ever-changing objects were overlooked. As a result, this approach was abandoned, drifting back to singular point products managed by the application or database administration teams.

However, for SOA environments with multiple RDBMS, traditional database monitoring by vendor type is no longer adequate or cost effective.

Database monitoring and collection of performance characteristics should be now thought of in terms of service availability elements that can be used generically across database vendors. Although overall database performance monitoring would be generic by key performance indicators, the capability of adjustment may be needed for site specific or application requirements.

To isolate database performance issues as well as perform their root cause analysis, it is not only critical to collect characteristic database specific performance information, but also the associated network performance and system performance information such as disk I/O, system CPU load and memory. Then with the interdependent elements monitored, the collected information is stored to be used for baseline and trending. It may also be called upon to go back to specific points in time for comparison correlation.

With knowledge of a typical baseline trend, performance behavior can then be observed as a cause and effect relationship as database workload changes. You can also use the baseline trend for notification of changes or issues that could have a forthcoming negative impact on business continuity. The capability to perform maintenance and administrative alteration independent of the vendor of the database as part of the workflow is equally important.

Whether as critical or early warning indicators, as problems are identified, they need remediation. In critical situations, a database administrator may not have the luxury of time before the database reaches a state impacting business, or worse, stopping it altogether. In critical situations, the typing in of SQL or combing through scripts or utilities to further diagnose and then repair is not effective; especially for each and every individual database. Instead a centralized approach offers the capability of a summary that aids in the isolation of the specific database(s) with the problem, further diagnostics if needed, and ability for speedy repair and resolution.

Fusion database management considerations

Oracle's latest version of its database, Oracle 11g, has even greater database functionality than previous releases. With increased database size and complexity, Oracle has focused on simplifying its database's own management in addition to the standard speed and feature enhancements to reduce the risk of losing customers to simpler RDBMS's with a perceived lower cost of ownership. Since Oracle v6, significant technological improvements have been made in the Oracle database. Yet, with advancements, there are still some database administrators using manual, old or Oracle database centric practices that will fail at some

point in the management of Fusion applications or other SOA applications.

With database advancements as well as Oracle's new focus as an applications company, this is where the change lies for Oracle database administrators. With SOA applications, database administrators no longer have to spend time second guessing the database with custom V$ query scripts or spend their time manually hunting and checking specific hit ratios, wait statistics, buffer pools, rollback segments, statistics gathering, checkpoint tuning and other manually intensive practices. Database administrators need to think and plan strategically across the infrastructure and not tactically for each individual database.

At a minimum to manage performance of databases for SOA applications, you need access to metrics internal to the database in addition to external metrics.

- Internal Metrics – These focus on the internal workings of the database vendor and include database memory, cache hit rates, contention and locking, SQL activity, etc.
- External Metrics – These are outside of the database and can impact database performance. These are operating system, hardware vendor or network related and includes CPU usage, I/O, system memory, network connections, etc.

The database administrators role is - "Planning, enabling and managing stored business applications data using repeatable practices and to ensure performance, availability, administration, and backup of databases."[1] While some past database management practices are still applicable, global business, service oriented application architectures and technology have fundamentally changed the database administration role adding new responsibilities and reducing others. Like Fusion application support of non-Oracle branded databases such as Microsoft SQL Server or IBM DB2, these are now added databases the Oracle database administrators are being asked to manage.

Especially with Fusion applications that support other database vendors, database administrators need to ask themselves "what SOA applications are connecting to databases, what are the dependencies to those databases that impact business, how can database performance and management of those databases be improved for business?" It is when the database administrator moves out of their tactical comfort zone that better service levels can be achieved. As the database administrator moves beyond thinking about the database in isolation but combined with the other infrastructure linkages that must be managed together as one, performance management goals can realistically be achieved.

Database administrators need to shift from finite database internals management to overall performance management, further reducing complexity that is fueled by global business growth. Database administrators have responsibility for not only databases, but also application servers, storage management, subsystem performance and network linkages.

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[1] Database Trends and Applications Magazine, December 2003, With Oracle 10g database administration changes, S. Lemme column

Review

IT Managers as well as database, system, network, and application administrators need to consider the following when developing performance management strategies for deployment of Fusion or other SOA applications:

Intranet / Internet

For applications connecting to services outside of company, on assets owned by partners, how and what will need to be monitored and integrated into the enterprise performance management solution? When a performance issue is isolated to an outside system, how are service levels interpreted and how will problem repair and resolution be executed?

Heterogeneous / Homogeneous

For applications and major infrastructure service components from one vendor, what are critical components leveraged but not provided by the vendor that needs coverage? For example Oracle eBusiness Suite, application servers and databases running on Microsoft Windows based servers across TCP/IP wide area networks. Is the plan to manage as an island with vendor supplied or point solutions or should you apply an integrated and correlated approach in the overall enterprise performance management solution?

For applications and major infrastructure services where the majority of components are from multiple vendors, how will performance issues be isolated, correlated and what is the workflow and what steps are involved for problem repair and resolution? For example PeopleSoft, BEA application servers and IBM DB2 databases on z/OS servers with SNA and TCP/IP networks.

For comprehensive performance management, a solution needs to cover systems and workload, network flow, database activity, application server transactions and storage interaction with the capability to correlate activity across multiple tiers and vendors.

Integration / Common data

Management of SOA applications needs to be service oriented itself and thus there is a fundamental problem with best of breed products. With what is considered to be inexpensive price points, domain specific products typically captured the end users attention with non-enterprise vendor proprietary functionality. With no common components and services, many companies have now found they have actually overspent on technology that is vendor specific yet overlapping in functionality with no capability to integrate or scale to meet future application infrastructure management needs. When complexity increases, "Islands of Management" separate and uncommon repository data stores themselves become an issue, leading to increased problem resolution time. In some cases, more time may be spent in operator or administrator disagreement or silent trouble ticket bouncing back and forth between groups for problem ownership than actually resolving the issue.

To manage increasingly complex environments and SOA application environments, you need to not only have deep domain information but integration of the data that enables it to be correlated across the tiers as well as displayed in manner that is accessible and eases the

workflow for the user. For example, a datacenter or NOC operator shouldn't have to look at each database individually or comb through hundreds of statistics to rule out that the problem is not related to a database. With "one source of truth" and display of the data by user personas, a single view of key performance information can be presented in a relevant manner. This eliminates the added time and cost experienced when switching between a number of different tools and user interfaces to accomplish a task common across vendors such as altering a database table or creating a new index.

Education

With SOA abstraction of services and orchestration across boundaries unfamiliar to many administrators, administrators may raise objections and barriers they perceive as problems they can not resolve. They are not barriers, but new opportunities with challenges that involve new approaches to overcome them. In particular, existing performance management practices will need to be extended and integrated to meet the complexity of demanding SOA environments. Whether to those in centralized IT groups or scattered across application teams or business units, IT Managers will need to reach out across the enterprise and establish an enterprise strategy with lines of communication and a manner to handle feedback and improvement.

As environments evolve with SOA applications, they will grow larger and become more complex, be on the lookout for the early warning indicators that your existing management is no longer adequate:

- Usability –Efficiency degrades as you try to scale traditional monitoring techniques and as databases grow in size and complexity
- Manageability – Undisciplined and unstructured growth in the volume and usage of the data is harder to manage each day. Databases running out of space, space over allocated as a just-in-case safety-net.
- Predictability – The growth of the workload across the environment becomes unpredictable with a majority of time fighting fires instead of pre-emptive maintenance.
- Portability – Monitoring not reusable across vendors, no common services or integration capabilities resulting in increased hardware and software management costs.
- Responsiveness – Multiple and overlapping sources of performance data and tools is delaying conformation of where the problem is and then its repair. Increases of bridge calls, rise in open troubletickets, as well as meetings are also symptoms.
- Cost – The amount of money spent continues to rise but little improvement is seen. The tendency is to throw more hardware at it to make the problem go away, versus identifying and resolving the problem root cause.

Conclusion

Traditionally, IT has focused on providing management for specific application functionality like monitoring an order entry system or deployment of a management solution for individual group project requirements. Whether not supported by executive management or equipped to focus on resolving underlying infrastructure management issues, some groups perceived a centralized IT organization ineffective demanding management control be returned to them. There may have already been a need for technology to handle the increasingly complex and large data environments overburdening and breaking existing management methods. While these reasons or others, the mere perception of not meeting service level objectives has possibly caught some IT personnel in a revolving door of centralization and then decentralization repeating itself when a new CIO arrives or political alliances change. With such disruption, just trying to keep up with existing business applications can overburden existing staff let alone what will be needed for SOA environments.

With dynamically changing technology like SOA extending beyond the conventional group, business unit, or company wall, it necessitates rethinking what was once thought of as managed. A new thought process of now combining the expertise of IT personnel for what the new solution should be is becoming the norm. A common misconception is to monitor parts of the infrastructure individually instead of understanding the underlying factors that drive performance problems and managing them to ensure end user satisfaction. With new management practices, IT has the real data to make informed decisions on how to improve the predictability, manageability and manage the cost of their environments.

Whatever the application, databases service the application and are the backbone of client-server as well as Service Oriented Architecture infrastructure. IT, not database administrators singularly, are charged with providing constant availability to vast amounts of data originating from multiple, heterogeneous databases. With data being essential to business operations, IT must ensure the peak performance of databases as part of the infrastructure.

Many have already discovered that it is difficult to manage when you don't know what you don't know! Since you can't improve what you can't manage, IT must start by collection and correlation of interdependent metrics across the complex infrastructure. Then those measurements can be used to triage, isolate and gain insight into what needs to be altered to improve performance not singularly, but holistically.

So why are some administrators' not leveraging new technologies already to manage growing databases and new complexity in preparation for Oracle Fusion? Primarily education and human nature - humans become comfortable in what they are doing and become highly resistant to change. Prior to Oracle database 10g, it was also easy for a database administrator to continue getting by with what they had used in prior releases. Yet, in 10g and now 11g, Oracle has fundamentally changed how you perform Oracle database administration. And now with Fusion applications on the horizon the time has come to move outside of the normal routine and reevaluate and rethink their management practices. Just like others within IT, the role of the database administrator must continue to transform and adjust in a service-oriented role as business and technology continuously changes.