



Lowering Total Costs with Oracle® Enterprise Manager and the Oracle Management Packs

An Oracle Business White Paper

November 1998





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EXECUTIVE SUMMARY

Corporations are embracing Internet computing for two main reasons; to improve business processes and to reduce the overall cost of their information systems. The fast pace of business changes, from globalization to the Internet, from downsizing to fast cycle time projects, makes adequately managing IT systems an important requirement for management information systems (MIS). According to a Meta Group, Inc. study, 48% of information technology (IT) spending is controlled by or in the hands of non-information systems (IS) management. The control will increase to 71% by the year 2000. This creates new needs for specialized management tools that can help IT professionals, enhance system performance, and reduce the overall cost of IT ownership, even in highly decentralized environments.

To address this need, Oracle Corporation created Enterprise Manager and the Management Packs. Each application offers comprehensive system management tools that can drastically improve the management of Oracle Servers, simplify the use of one of the most central pieces of the IT infrastructure, and enable substantial savings through benefits such as easy troubleshooting or automated tuning.

The Oracle Management Packs pay for themselves many times over through savings in training costs, hardware and software costs, and most hidden costs such as system downtime and slow response time. According to Howard Rubin's 1995-96 Worldwide benchmark project on IT spending, practices, and performance, the top 500 U.S. companies by revenue spend \$100 billion annually within their information systems organizations and spend on average more than \$6,000 per employee on IT annually. Rubin stated that 30 cents of every IT dollar is wasted on work that does not add any value and fixing software defects costs up to 22 cents. This is worth considering when making investments on database management technologies.

THE DATABASE MANAGEMENT CHALLENGE AND ITS ASSOCIATED COSTS

The complexity of today's computing environments can turn managing a company's computer systems into a difficult ordeal. Database administrators (DBAs) will find themselves mired in environments containing disparate hardware and operating systems with applications distributed across many physical locations. When deploying new on-line transaction processing (OLTP) or data warehouse systems based on lower-cost, mid-range hardware, companies have to create a new system infrastructure allowing for:

- Integration of pre-existing software and hardware infrastructures.
- More control and empowerment by lines of business personnel.
- Deployment of global solutions in remote geographical locations.
- Integration of multiple-packaged solutions with homegrown specialized applications.
- New, specialized backup and recovery mechanisms.
- A tight security infrastructure allowing for control in a decentralized fashion.

Every year companies spend millions of dollars in software, hardware, and human expertise to implement systems that effectively manage their IT infrastructure. A landmark study conducted by the Gartner Group in 1994, found that the total cost of ownership of a standard personal computer in a corporate setting is over \$10,000 per year. The actual purchase price of the system contributes only a small percentage of that figure with a much larger percentage attributed to support costs — including help desk, repairs, and software upgrades.

Although the cost of system management can be high, the risks associated with a poorly run IT infrastructure are certainly much higher. When a company's core applications fail or become excessively slow, the consequences can be catastrophic. To a typical end user, a system crash may be a minor annoyance, but to management, that same crash is measured in lost productivity and revenue. These losses come from several categories discussed in detail below.

Hidden Costs

A number of costs associated with running complex environments are called hidden costs. Hidden costs are not recognized, yet they should be among the critical considerations made by businesses. Two of the greatest risks associated with poorly planned IT systems are high system downtime and lower response time. A well-managed computing environment that minimizes these risks is well worth its cost of implementation.

High System Downtime

A company's core applications need to be on-line for its employees to work efficiently. When these applications stop working, orders cannot be processed, checks cannot be issued, and customer records cannot be accessed. In short, the financial effects can be devastating in terms of decreased productivity and lost revenue. The single, most-compelling reason for a solid system management strategy is to minimize company downtime.

Most large companies make direct associations between the minutes of system down-time and lost revenue, and make financial projections based on those correlation's. For example, for a large nationwide retail company, 40 minutes of system downtime can result in one million dollars in lost revenue. While large companies are accustomed to spending thousands of dollars to create systems delivering high fault tolerance and availability, small and mid-sized companies often fail to make the same kind of investment to protect their computer systems. Even in these smaller environments, a single episode of systems failure can be devastating.

Low System Response Time

The most often voiced complaint by users is slow performance when accessing the database. Even when a company's database systems are running, slow performance can still result in lost revenue and decreased productivity. For example, consider a technical support department with 100 support personnel constantly accessing customer records. In a normal environment, a query may take 30 seconds for all the relevant customer information to appear on the screen. By implementing a series of performance optimizations, it may be possible to reduce wait time from 30 seconds to 20 seconds. As a result, the department can field more support calls and may be able to reduce the number of personnel needed to handle incoming calls.

Cost of Repetitive Tasks

Database management is becoming a complex science as databases are becoming larger and distributed. Much administrative time is spent performing basic management tasks at the command-line level or through simple scripting tools. These tasks are not only cryptic and repetitive, but they are many times undocumented and prone to human errors. They tend to be used as "recipes" for last-minute fixes instead of general procedures that have passed quality assurance standards.

Only a complete, on-line management solution that provides proactive monitoring, diagnostics, troubleshooting, and automated tuning can create a productive environment and reduce the amount of work being redone.

Training Costs

DBAs have varying knowledge levels, as well as different skill sets than the project managers that build and implement new systems. And DBA training programs are not always considered when projects first are started. Projects using technologies from different vendors also complicate the tasks of managing the environment and require highly skilled and trained DBAs.

A typical example is when businesses purchase packaged applications running on top of the Oracle Server. Application managers often do not work closely with the DBA and cross training may not be considered. Poor database performance can result in project delays and failures, thus creating huge costs. With distributed implementation where databases are deployed in multiple locations, skilled DBAs often are not available on site and training non-IT personnel in database management can be challenging.

Hardware Costs

If management means centralized use of resources and lower costs through better practices, it also brings better knowledge and understanding of performance. In database environments, it means cost savings for at least two main reasons:

- Carefully observing database behavior, optimizing resources and CPU consumption allows for optimization of hardware platforms, disk arrays, and overall systems configuration which will sometimes lead to expensive upgrades savings through better use of resources.
- Over time, management skills and experience allow for better planning and management of resources which create more saving opportunities. Without the adequate knowledge base and a well managed environment, it is impossible to draw decisive conclusions when choosing between hardware upgrades, the next generation of hardware servers between two different Operating Systems or Disk Arrays technologies. DBAs can play a leadership role in recommending the best suited environments to lower total costs when running OLTP database applications or data warehouses if only they have the adequate tools to measure performance and to compare head to head the different systems available in their data center or in the distributed environment.

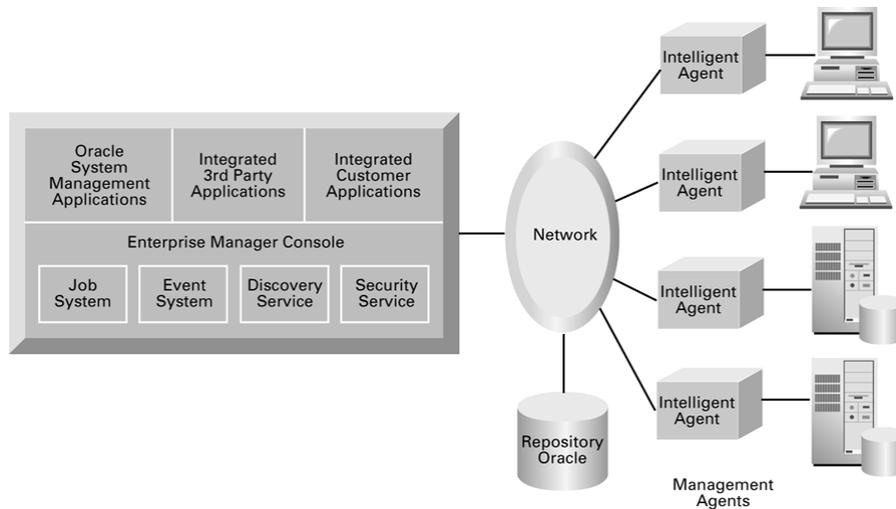
A CASE FOR DATABASE MANAGEMENT TOOLS

Given the risks and increased costs associated with poorly tuned application systems, it makes sense to invest in tools that help minimize those risks. Oracle provides a suite of software tools called Oracle Enterprise Manager and a specialized set of applications called the Management Packs. These tools let DBAs improve drastically the performance of databases and applications, and proactively manage the servers they control.

Oracle Enterprise Manager

Oracle Enterprise Manager provides an open, comprehensive framework and tool set to manage and administer the complete Oracle environment from an easy-to-use centralized console. Oracle Enterprise Manager is shipped with Oracle7™ or Oracle8™ and used by DBAs to manage their daily tasks, such as defining new users and roles, executing SQL scripts, editing schema objects, and monitoring the status of their Oracle environment. Over time, all Oracle products will be integrated to be managed from the same tool giving a unique graphical user interface (GUI) to the Oracle product set, from the database to the Web Application Server and Oracle Applications. The Oracle Enterprise Manager product architecture has three major components:

- *Console* - Presents information that is intuitive and easy to navigate, creating the perception that the distributed environment of computers and databases are in one huge data center.
- *Repository* - A set of database tables holding all the information necessary to manage one or multiple services. An administrator can log onto Oracle Enterprise Manager from a connected console in a remote city and access their repository for off-line systems maintenance or monitoring.
- *Agents* - Independent pieces of software residing on remote nodes that perform scheduling, monitoring, and maintenance activities of those nodes. Even if disconnected from the console, intelligent agents can report updated status once normal communications have been restored.



Oracle Enterprise Manager Architecture

BENEFITS OF USING ORACLE ENTERPRISE MANAGER

Since Oracle Enterprise Manager is the standard interface for Oracle products, DBAs and system administrators will quickly become familiar with its easy-to-use and unique interface. This standardization will lower training requirements and allow for more centralized control over database management.

In environments with a large number of managed databases, it is important to use a system management tool that can remotely administer products from a central location and avoid redundancies. Oracle Enterprise Manager allows centralized management, facilitating training and ramp-up time for new users with its intuitive drag-and-drop environment. Thoroughly tested scripts can be used centrally by all DBAs and are applied to the environment through the console.

When the management needs to scale, Oracle Enterprise Manager allows for multiple DBAs to work together. It also provides for multiple configurations and look and feel, depending on the skill level of the user and the type of environment running. Some DBA functions are predefined allowing for non-expert users to perform advanced DBA tasks.

The architecture of the product allows for "Lights-out" management. Through the use of the job scheduling and event management functions, the DBA team can create automated ways to resolve complex tuning problems on remote nodes, even when administrators are not available or network connections are disrupted.

Another advantage of the Oracle Enterprise Manager framework is its flexibility. Developers now can integrate their applications within the framework for management purposes. This feature, which first was reserved for Oracle developers, has been extended to all Oracle partners and customers resulting in substantial cost savings by creating a common interface to manage all applications within an IT environment.

The Oracle Management Packs

The Oracle Management Packs can significantly increase a DBA's productivity and make them more efficient. A DBA has to analyze all the factors that can affect the performance or potential failure of their database systems. DBAs trained in performance tuning, charge \$200 per hour or more and can spend days collecting and analyzing data. Businesses can quickly recover the costs of the Management Packs in terms of man-hours saved by avoiding the need for DBA analysis.

The Management Packs provide essential information to help DBAs understand their computing environment and proactively make decisions. With the Management Packs, DBAs can:

- Recommend new index strategies.
- Develop detailed performance tuning evaluations.
- Perform detailed traces of all database activity which then can be used to diagnose performance bottlenecks.
- View graphical statistics generated in real time to diagnose the current state of the database environment.
- Automatically identify the SQL statements that are executed most often on the system and determine their resources requirements.
- Add SQL hints for optimized table join strategies.
- Collect operating system data for historical analysis and capacity planning.
- Automatically tune the top 25 instance parameters effecting performance, such as log buffer settings and sort operations.
- Capture the object definition of a schema or database at a given point in time.
- Move a table to another tablespace in order to tune your application.

When administrators use the Management Packs, the overall cost associated with optimizing and tuning database systems is reduced. Large companies spend thousands of dollars to hire teams of DBAs that manually create scripts to perform the same work that the Management Packs conducts automatically. Smaller companies which do not have the budget to hire teams of DBAs, often run their systems with-out making the performance optimizations that the Management Packs can provide. Their potential savings is lost in terms of slower response time and a lack of clear understanding of the system when problems do arise. By using the Management Packs, both small and large companies can afford to optimize their database environments.

USING THE MANAGEMENT PACKS: A TYPICAL SCENARIO

Taken together, the applications provided in Oracle Management Packs can significantly help DBAs monitor database performance and solve common performance problems. For example, consider the common scenario of a user complaining about slow performance when accessing a database. Assume the DBA manages numerous databases in various remote locations, with several hundred people accessing financial applications residing on those databases.

The slow performance is noted by Oracle Event Manager which automatically pages and alerts the DBA. Using Performance Manager, the DBA glances at the Overview chart noticing a high number of physical writes per second in the File I/O section. Drilling down, the particular datafile associated with this increased activity is found.

Oracle TopSessions is opened to get a view of the user sessions causing the file-access problems. Using Oracle TopSessions, the DBA gets a listing of the top 10 active sessions based on file I/O activity. Selecting the session with the most file I/O activity, the DBA drills down for more data. The SQL statement currently executing for that session and the explain plan for that statement is reviewed. The DBA notices that a sequential search routine is employing indexing improperly.

As a short-term solution, the DBA can directly terminate the offending session with Oracle TopSessions. In the long term, the DBA can fix the offending SQL code — perhaps with the help of Oracle Expert™ which can modify the index to increase performance.

This simple scenario shows how some of the Management Pack components can be used to solve problems. The customer testimonial to follow describes an actual situation where another Management Pack component, Oracle Expert, replaced the work of a team of DBAs to solve significant performance problems.

A CUSTOMER TESTIMONIAL: OXFORD HEALTH SYSTEMS

Oxford Health Systems is a leading health care provider. Alan Lendaro, who manages the DBA group at Oxford, installed an off-the-shelf, help-desk application based on Oracle7 running on a Siemens-Nixdorf server. This application is used to log incoming help desk calls, route complaints to appropriate personnel, and track the progress of a problem until resolution. The application services 30 to 40 people, all running Windows-based clients.

Oxford uses Oracle Enterprise Manager with the Management Packs to monitor the performance of their help-desk system. According to Lendaro, when they first installed the help-desk it was so slow it was practically unusable. Although they had been getting many complaints about the speed of the system, they did not have the in-house resources to devote specifically to optimizing performance.

To resolve the situation, Oxford used Oracle Expert, a component of Management Packs to analyze the application environment. After the analysis process, Oracle Expert made a series of recommendations to optimize performance. Upon review, the Oxford staff decided to implement all of the recommendations.

After the changes were made, the system performed "orders of magnitude" faster according to Lendaro. With the Oracle Expert changes in place, all of the user complaints about performance ceased and the help-desk application ran smoothly.

The value of Oracle Expert, according to Lendaro, was that it freed his DBAs to do more important tasks than manually writing SQL scripts. "Oracle Expert lets you focus on what you're trying to do, rather than how to get there," says Lendaro.

The next steps for Oxford are to use Oracle Expert to analyze other databases in the company, including a Pyramid-based MPP server that serves 3600 employees using the Oracle Parallel Server.

Lendaro's group also uses other Management Pack components on a regular basis, including TopSessions and Tablespace Manager. In particular, Tablespace Manager has proved especially valuable in helping Lendaro deploy a new application without any historical data regarding its future growth. Tablespace Manager has helped him with sizing issues letting him visually manage objects within a tablespace and check space management.

CONCLUSION

Oracle8i™ is designed to support all of a customer's users and data, providing a high-performance and cost-effective system for running business applications. Oracle Enterprise Manager and the Management Packs are the perfect complement to Oracle8i, bringing down the overall cost of ownership of the most ambitious applications even further.

The Oracle Management Packs are an integral IT strategy part ensuring the proper health of a company's database system. The Management Packs are invaluable tools that help DBAs analyze database performance and diagnose potential problems, but also allows for Lights-out management and auto-tuning. The Oracle Management Packs will pay for itself many times over in terms of lower system downtime, higher performance, and reduced DBA staff costs.



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