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HRG Assessment

Autonomic Computing and Sybase's ASE 12.5.1

Introduction

The computer age began with vacuum tubes, green bar paper and punch cards. In the late 1980's automated or lights out operation was in vogue and now in 2003 we are on the verge of realizing the benefits of such grand visions as Autonomic Computing, and Grid Computing. The trend is toward increasingly automating those day to day repetitive operations that can be handled by rules based logic. Removing these sources of potential human error will also free up skilled and valuable human resources for other higher value tasks.

The Challenge

As computer systems get faster, easier to use, and more widely utilized they have become more complex and harder to manage. The advent of e-Business has further exacerbated the situation. Vendors of hardware and software products have made much noise and created much confusion while trying to win market share at the expense of their competitors (Hopefully Autonomic Computing will not emerge as just another excuse for more noise). This in turn has given the purchasers and users of these "faster, better, cheaper, and easier to - use, install and configure systems" great cause for concern and a great deal of extra work as they try to sort vision from fact and marketing hype from product reality. Additionally they want to ensure a reasonable return for any investment in these new technologies they may be brave enough to make. The ongoing challenge for today's Information Technology professional is to continuously satisfy an increasingly demanding set of end users (read as those who pay money) by selecting, purchasing, implementing, and maintaining software and hardware products that will stand up to the work loads generated by increasingly demanding customer requirements now and for the foreseeable future (read as the next 18 months).

Harvard Research Group feels that Sybase's ASE 12.5.1 is an offering worth considering for use in business critical transaction intensive environments. The real benefit to be had from using Sybase's ASE 12.5.1 can be seen in the business result - improved effectiveness - being able to process more transactions during peak hours and then quickly return to processing business as usual workloads. With this type of functionality in place more work of higher value can be done with the same staff and less error. This new release of ASE has a good fit with current business requirements whereby businesses are increasingly finding new ways to use computers in order to drive improvements in revenue and profitability.

Autonomic Computing

Recently much has been made of the analogy drawn between Autonomic Computing and the human autonomic nervous system. This process of definition by analogy draws clear comparisons regarding the way in which the human nervous system manages or runs the human body and the vision of how, at some as yet to be determined point in the future, computer systems potentially comprised of heterogeneous systems and subsystems will manage the for profit and not for profit human enterprises and organizations of the future. This is a valuable frame of reference!

Characteristics

The four characteristics of an autonomic compute environment according to IBM are that the system be "self-configuring, self-healing, self-optimizing, and self-protecting". Because this is a somewhat artificial logical construct that has been put forth in order to express a "Grand Vision". Having said this and understanding that Autonomic Computing is a vision for the future it is apparent that this logical construct is extremely valuable as a way to better understand the current and emerging challenges that IT professionals are faced with. The true value of the Autonomic Computing Vision as put forth by IBM and echoed by journalists and analysts is that it causes you to break free of the here and now and provides a fairly clear and reasonable understanding of the size and speed of the train (increasing systems complexity) which is bearing down on us.

There are other versions of this vision as articulated by vendors such as SUN and H-P, however, at the highest level of these messages where business results are produced and revenue is generated. Sun's N1, HP's Adaptive Enterprise, and IBM's Autonomic Computing as visions and statements of strategic direction all share the common goals of reducing human error, increasing system utilization, and facilitating system management through the virtualization of key compute resources. For the balance of this paper, in order to clarify our discussion, the term autonomic computing will be used to refer to these collective strategic vision statements. While the specific way each vendor delivers technology to meet these requirements is interesting it is not essential to our understanding of the current state of the computer industry and how we came to this point.

Why is this important?

Autonomic computing is important in part because it holds out the promise of cost reduction by eliminating down time. Research has shown that in 32 to 40% of the cases where significant outages have occurred the cause could be traced to human error. Interviews conducted over time show that the length of an outage is exacerbated and compounded by human error during recovery from a fault or failure. The incipient strategic vision for autonomic computing when realized will, if it works as advertised, effectively reduce the cost of downtime due to human error through rules based automation.

A key component in the total cost of any system is the cost of labor. Labor costs are continuously escalating as increased competition drives the business requirement for more highly skilled and specialized IT professionals. When businesses require smarter, better educated, better trained and more skilled labor, the cost of that labor due to its scarcity will increase causing a significant increase in the total cost of operations. The promise of autonomic computing is that organizations will be able to free up their most expensive highly skilled people by automating many of the mundane tasks that currently account for a large part of their time.

Today businesses regularly and continuously increase the demands placed on labor as a system component. In the case of a database administrator (DBA) the continued growth in the volumes of data, number of transactions, and frequency of unique queries are pushing the DBA to their limit of effectiveness. DBA's and other IT professionals are being pushed right to the breaking point by these ever increasing demands resulting in increases in the frequency of human error, system down time, and loss of revenue.

By pushing their IT staff in this manner, businesses are skating on thin ice, continuously courting disaster with no real solution in sight. However, autonomic computing and its potential to shore up IT staff resources provides some hope that in the near future we will be able to again drive the operational scalability and productivity of IT systems to new heights. The effect is similar to the effect that the introduction of the assembly line had on industrial output during the days of Henry Ford.

HRG believes that businesses implementing autonomic computing will be able to extend the reach of the DBA and other IT professionals skill sets resulting in continually improving levels of support for their mission critical business computing requirements. The implementation of Autonomic Computing is expected to directly result in making labor as an IT resource and system component more capable and less brittle. However, it is our considered opinion that the elimination of the human labor component of IT systems will not happen in the foreseeable future.

Making DBAs more capable and empowering them through the implementation of some of the base functionality of autonomic computing will serve to control their labor cost. The intent is not to eliminate the DBA, an unrealistic goal, but to enhance the scope of work that these highly skilled professionals can effectively deal with. Sybase understands the demand for IT professionals to hold costs flat while processing ever increasing volumes of data and transactions. The message from upper management is clear: "improve utilization – get more for less" - in a nut shell the volume of data transactions required by businesses will continue to grow exponentially and yet businesses can not afford to allow their operational costs to grow at the same rate as data and transaction volumes.

Today we are at a point where the useful or usable size of databases is realistically constrained in a number of operational scenarios to roughly 150 Gb at the top end. Some managers claim to have from 250 GB to 10 TB of data under management. The reality is that these large data sets are actually managed over multiple servers or that it is decomposed into smaller more manageable increments.

The ability to handle large databases and their transaction loads is further constrained in terms of the transaction volumes that a single server can realistically process. The reality of what we can manage from a systems point of view is perhaps 5 to ten times greater than what we can manage from an operational view (what the people, DBAs and other IT professionals can handle reliably). People are a fundamental operating part of any IT system and should be viewed as the heart that pumps the life-blood (data and transactions) for many information driven businesses.

On-line business transactions and e-business are the unknown in terms of systems workload and capacity management. Our ability at a human level to handle the scale of data that is being continuously expanded by normal business and e-business forces has become constrained.

Sybase has openly stated that they are aggressively working with their partners and users to remove or delimit this constraint in order to deliver less restricted system scalability.

Homeostasis Anyone?

Sybase ASE 12.5.1 is a database whose characteristics allow the system to persevere without human intervention in spite of pressures from changes in capacity that would unbalance it. A good term to describe the capability that this new functionality brings is Homeostasis. Homeostasis as defined by Webster's Dictionary is a relatively stable state of equilibrium or a tendency toward such a state between the different but interdependent elements or groups of elements of an organism or group.

Sybase ASE 12.5.1 – Designed with Autonomic Computing functionality

ASE 12.5.1 runs on a range of systems from “Linux-based Intel systems to 64-processor RISC-based platforms” According to Sybase, ASE 12.5.1 is by design easier to use, more resource-efficient, more reliable, and easily integrated with enterprise applications and systems. For the purpose of this paper we will focus our attention on the area of “Self Management” which is a key attribute and one of the four core concepts of Autonomic Computing. Sybase's ASE 12.5.1 has been significantly enhanced as a direct result of ongoing continued input from their installed base.

HRG believes that the recent improvements made to Sybase 12.5.1 will effectively reduce human error by reducing the number and frequency of the low-level maintenance tasks that DBAs are required to perform. In terms of the self management capabilities embedded in ASE 12.5.1 Sybase has taken significant strides towards freeing DBAs from having to perform repetitive, mind numbing tasks thereby providing them with the chance to focus their skills and talents on higher level concerns.

In addition to reducing the drudgery and boredom that DBAs experience every day, Sybase, through ASE's enhanced self management functionality, is able to effectively reduce its total cost of ownership. The real opportunity to reduce RDBMS cost of ownership will become clearer through a brief examination of the underpinnings of Sybase's self management capabilities.

ASE 12.5.1 – Self Management

The features / modules that comprise Sybase's ASE 12.2.1 self management capabilities are described below:

Job Scheduler – This module can be leveraged to free up DBAs to do higher value work by automatically scheduling routine jobs - for example, backups, consistency checking, index management, and reports. The Job Scheduler can be extended in order to further reap the benefits of automated job scheduling through programming the scheduler to automate additional repetitive tasks. By extending the functionality of the Job Scheduler in this manner a DBA can be further freed up to focus on other less mundane aspects of their job thereby delivering more value to the enterprise.

ASE's **Automated Database Space Management** module helps ASE run for extended periods without the requirement for human intervention by giving Database

Administrators the ability to pre-set growth and threshold requirements thereby allowing databases and logs to automatically grow or change in response to dynamic / changing load and system requirements. As is the case with the Job Scheduler module above, the Automated Database Space Management module when used as intended will free the DBA from lower level maintenance and management tasks to focus their efforts on providing higher value for their enterprise.

ASE's **Automatic Backup Management** module (a Job Scheduler Template) automates the process of making regular scheduled backups of databases and logs thereby further freeing up the DBA for higher value and more rewarding work.

ASE's **Automatic Resource Management** module (a Job Scheduler Template) allows an ASE server to respond to changing conditions in a mixed-workload environment without human intervention by monitoring and dynamically adjusting key database resources, for example; connections, and locks, thereby avoiding system resource bottlenecks that can occur under increased loads.

Using ASE's **Automatic Garbage Collection** module makes maintenance tasks such as performing table and index reorganizations unnecessary as the garbage collection mechanisms aggressively clean up any unused space during the automatic garbage collection cycle.

ASE 12.5.1 – Security

In ASE 12.5.1 Sybase has made the following security and authentication enhancements – single sign on, single point of administration, and single point of user access. The result is less down time due to intrusions and security breaches and a security officer that is freed up to function at a higher level of effectiveness.

Sybase has improved their single sign on capabilities through LDAP for centralized management of identification, authentication information, and at a macro level centralized management of permissions. The clear majority of security failures and the resulting system outages are due to human error. The security enhancements made to ASE allow a security officer to handle larger user populations, and more granular authorizations.

With this type of centralized approach a security officer is able to focus more of their valuable time on prevention by keeping systems up to date with the latest virus updates and patches from their suppliers. Finally, this centralized approach will also allow them to better focus on the effective use of IDS tools by analyzing the outputs from IDS tools and Firewalls.

ASE 12.5.1 – Availability

Floating IP Support – Previous versions of Sybase ASE had relied on client connection failover and did not use the floating IP mechanism. However with ASE 12.5.1 Sybase has added floating IP and improved integration with third party cluster systems. This feature supports active-active nodes to be setup on a two-node cluster and additionally supports active passive setup on a two-node or multi-node cluster. Sybase customers now receive the benefits of reduced network timeouts and faster client application failover. This enhancement to ASE serves to simplify configuration of clients while potentially making the client connection more flexible and scalable. Specifically for clusters offered by Veritas, HP, and SUN client connections can be transparently

migrated between systems in a failover scenario reducing the amount of time until the system fully recovers.

Dynamic Listener - With ASE 12.5.1, administrators can now start, stop, or query system listeners without rebooting. This feature allows administrators to easily create additional listeners as demands for the system increase, as well as quickly recover from system attacks where listeners have been flooded with thousands of disingenuous requests. It also allows the system administrator to keep an unpublished listener available for administrative use.

By having this enhanced feature, users can start new listeners on new ports at any time, which is very useful during failover. In the case of a denial of service (DOS) or other security related attack on a specific ASE the DBA can suspend the specific listener port and protect ASE from further attacks on that port. Using the enhanced dynamic listener feature a system administrator can login to ASE through a non-advertised port (a port not appearing in the interfaces files) in order to perform maintenance tasks, while disabling all login from advertised ports. Once the maintenance is completed Login through the advertised ports can resume without having to reboot the server.

Conclusion

Sybase's ASE 12.5.1 database goes a long way toward enabling some of the basic functionality required if we are ever to fully realize the potential promised in the recent spate of "Grand Vision" statements from the likes of IBM, HP, Sun and others. By delivering self-management functionality at this point in time Sybase is demonstrating a real regard for their customers technical challenges and business requirements.

Harvard Research Group feels that Sybase's ASE 12.5.1 is an offering worth considering for use in business critical transaction intensive environments. The real benefit to be had from using Sybase's ASE 12.5.1 can be seen in the business result - improved effectiveness - being able to process more transactions during peak hours and then quickly return to processing business as usual workloads. With this type of functionality in place, more work of higher value can be done with the same staff and less human error. This new release of ASE has a good fit with current and evolving business requirements whereby businesses are increasingly striving to find new ways to use computers to drive improvements in revenue and profitability by actively improving the customer experience.

Harvard Research Group is an information technology market research and consulting company. The company provides highly focused market research and consulting services to vendors and users of computer hardware, software, and services. For more information please contact Harvard Research Group:

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