CLOSING THE OPERATIONAL GAP

The cost of operations is typically the largest contributor to Total Cost of Ownership. Over the last several years, the volume of data and transactions has grown exponentially—rising faster than the resources available to support these larger workloads. The larger this operational gap, the higher the costs required—people and infrastructures—to close the gap. Sybase ASE incorporates many innovative features to control operating costs against this rising tide of transactions and data.

Self-Management

Sybase ASE is enhanced to make administration tasks easier and more efficient. With the Job Scheduler, ASE focuses on solving day-to-day operational aspects of managing a database, so that database administrators can focus on higher-level functions. Job Scheduler incorporates a secure mechanism to create, manage, and execute jobs using roles and/or usernames with passwords, offers a centralized solution without the need of text files scattered around, and possesses a GUI to simplify the management of routine DBA tasks. Operations such as database backups, update statistics, DBCCs and reports can be completed with easy setup in the Job Scheduler. Users are allowed to perform daily operations, execute jobs and maintain administration history in a controlled environment.
Automated Backup, Resource Management, and DB Space Management
Wizards are available in Job Scheduler to perform automatic backup and can dynamically adjust database resources. In addition, the Automated DB Space management feature allows the databases and the associated log devices to grow automatically and dynamically responding to the requirements. When the database, log or table space is nearly full, ASE automatically evaluates the various devices available, choosing the best device to expand on, and automatically adjusts the database size. Administrators can configure the default values (for growth, thresholds etc.) such that ASE can respond in the best manner for their environment.

EASIER ADMINISTRATION
Sybase ASE also incorporates many features to make administration of the database easier, as well as more reliable and flexible.

Security and Authentication
Sybase ASE offers significant advancements in centralized authentication and management of users in the Security & Directory Services package. Using a LDAP server or Microsoft Active Directory, many Sybase ASE servers can authenticate users from a single administration and control point with no changes required to the client applications. With Sybase ASE’s support for Pluggable Authentication Modules (PAM), corporate security systems can be directly integrated to validate user and administrative access. Sybase ASE also supports CyberSafe, MIT Kerberos, and native Kerberos libraries for authentication.

ASE employs FIPS 140 certified SSL encryption algorithms to protect data as it is transferred between the database server and its clients.

Security for Database Administration
Sybase ASE improves the security of administrative functions by password-protecting backup files, increasing the granularity of set proxy operations to specific roles, supporting grant and revoke permissions for users, roles and groups for specific commands, and restricting permissions on system catalogs.

Dynamic Cache Management
Dynamic Data Cache provides users the ability to add memory to a cache, add a new cache, delete a cache, and change the cache replacement policy dynamically. This feature provides flexibility for users to configure named caches, and simplifies the process for re-configuration. When using dynamic data cache, caches can be configured appropriately to adapt to the workload without having to reboot the system.

Floating IP Support
Several cluster systems such as Veritas Cluster System, Sun Cluster and HP MC/ServiceGuard have provided the floating IP facility that maps logical addresses to physical addresses. The ASE HA solution supports floating IP for tight integration with third-party cluster systems.
Dynamic Listener
Dynamic Listener allows administrators to dynamically start, stop, or query listeners on a per-engine basis so that new lines can be added to the interface file, and new listeners can be brought up on the corresponding ports of any subset of engines. Listeners can also be brought down on any combination of port and engine. This includes the case of stopping all listeners on all ports. With this feature, administrators can start new listeners on new ports at run time, which is very useful during a failover in an HA configuration.

Transportable Databases
The Mount/Unmount commands allow users to have “portable” databases, as they have been doing with hard drives or other hardware devices. Mount/Unmount moves (relocates) or copies (duplicates) a database from one ASE installation to another, and produces a snapshot of the image of a database at a given time. It is a solution to users who need to setup a standby database copy for multiple purposes, including decision support and reporting. By using Mount/Unmount, application developers who pre-build their systems on ASE no longer need to execute multiple commands during installation to create and populate databases. Instead, they can pre-build a single database, store it in a central location, and then copy additional ones when necessary. The use of Mount/Unmount also allows the quick creation of a secondary server without needing to interrupt the source server.

The Performance Monitoring Option
The Performance Monitoring Option, also known as DBXray for Sybase from BMC, is a graphical performance monitoring and diagnostic tool. Built on a two-tier architecture, it is optimized for use in an enterprise environment where more than one person may need to monitor multiple servers at the same time. The Performance Monitoring Option can be run as a standalone program or as an applet that is downloaded to a browser. It provides detailed performance statistics on a wide range of ASE attributes, from process status, performance statistics and SQL text to locks, CPU, database and data cache usage levels. In addition to this performance data, the Performance Monitoring Option also provides notification of ASE errors, access to ASE’s errorlog, and a display of ASE’s current configuration values. This is not shipped as part of ASE, but is a separately licensed option.

ENHANCED PERFORMANCE
ASE includes many new features to make better use of system resources. These features make it easier to administer larger data sets through streamlining of internal and external processes as well as enhancing application performance.

Index Sampling
Another key enhancement to scalability is the use of index sampling for managing the index statistics, which in turn drives cost-based optimization of queries. Traditional methods for computing these statistics involved evaluating every indexed element to get an exact proportion of each represented value. For very large indexes, this became an expensive and time consuming process to update the database's statistical tables as additional data was collected, stored, and indexed. ASE’s index sampling technology allows DBAs to evaluate index distributions by examining a fraction of the total data set, saving valuable time for large data sets.
Smart SQL Statement Cache
Sybase ASE can compare ad-hoc queries to previously executed SQL statements and re-uses existing query plans when appropriate to avoid unnecessary query compilations. When a query is parsed, ASE identifies the specific variables that have been used and converts them into procedure parameters. ASE then compares the parameterized statement for a matching previously used statement in the statement cache. This conserves system resources when an application can re-use existing query plans and also greatly improves performance for these applications and for all other database users.

Parallel Recovery
An important enhancement to the operational capability of ASE is Parallel Recovery. Larger data sets usually imply more data to be verified after a crash. With Parallel Recovery, the entire recovery process from HA-switchover or crashes is dramatically faster.

Backup Compression
Sybase ASE reduces required disk space for recoverability and improves recovery performance by supporting compression of backups to file systems or raw devices.

Scalable Logging
This new feature improves the overall throughput of the system by increasing performance of the system transaction log. With ASE, contention for log space has been reduced and a new feature, optimistic index locking, has been added. Internal benchmarks show significant improvement in system throughput.

Multiple Tempdb
The new Multiple Tempdb feature allows administrators to create multiple temporary databases and assign users to these databases to reduce contention for temporary table space. This reduces contention and increases the scalability of the system while increasing the flexibility for temporary space management for administrators.

Advanced Database Reorganization
Internal processes of the ASE server have also been streamlined and improved. For example, ASE now allows multiple housekeeper threads to be created to speed up multiple simultaneous administrative tasks of the server. Improvements to the data organization system have been made. With ASE the REORG and REORG RECLAIM_SPACE commands can now be used to effectively control growth of those tables with significant INSERT and DELETE activity.

LOWERING THE COSTS OF DEVELOPMENT AND DEPLOYMENT
Today's cutting-edge database applications must take advantage of ways to accelerate development and simplify deployment. ASE adds to an already prodigious set of application development features in the Sybase ASE family of products.

Real-Time Message Services
Sybase ASE supports the Sybase Real-Time Data Services package, with Real-Time Messaging functionality for active event publishing and subscribing. Applications that generate or require real-time data updates can use Sybase ASE Real-Time Message Services functionality to publish or subscribe to these changes using a standard JMS message bus. For users that depend on real-time changes to critical business information, Sybase ASE Real-Time Message Services functionality provides real-time alerts and notification, and gives them instant access to these changes. By integrating these services into Sybase ASE as message-based events, applications now have instant access to these business critical changes without requiring frequent polling of the database to identify changes, improving performance for all users, and simplifying application development and support for these real time applications.
Advancements in Web Services Technologies
The introduction of Web services has provided customers with a unique tool to reduce the cost of integrating disparate software systems. Web services are self-contained, modular applications that can be described, published, located, and invoked over a network—generally the Internet. A customer is able to use Web services to act tactically, while maintaining a strategic outlook. That is, a pilot project based on Web services can be executed to measure ROI, while maintaining a long-term vision of how to integrate the enterprise.

Available as an option, the ASE Web Services Producer and Consumer provide the customer with the ability to access ASE using Web services. This option allows access to ASE from any language, on any platform. By reducing maintenance costs and eliminating the need to learn a new protocol to talk to, ASE reduces the cost of ownership for the overall system. By combining the ability of ASE to manage data in a secure, scalable fashion with the connectivity available in Web services, the customer has a solid platform on which to base integration of disparate systems.

Support for Derived Tables
Derived tables allow users to quickly create tables inside a SQL statement without needing to create a temporary “view” of the data first and later disposing of this temporary view. This speeds development that will simplify complex SQL handling.

Additional Globalization Features
To handle international data, ASE supports a variety of Unicode technologies including UTF8 and UTF16. Users can employ UNICHAR and UNIVARCHAR types for all default character sets and also sort UTF8 data.

ASE EDITIONS
Sybase Adaptive Server Enterprise (ASE) comes packaged in four editions depending on your needs. These are:

• ASE Developer's Edition
• ASE Linux Express Edition
• ASE Small Business Edition
• ASE Enterprise Edition

ASE Developer's Edition is the ideal choice for developers wishing to build RDBMS applications. Available for download from Sybase's website at no cost, ASE Developer's Edition comes pre-packaged with all the tools needed to develop high performance applications for Sybase ASE.

For Free Deployment, Sybase offers the ASE Linux Express Edition. Also downloadable from Sybase's Website at no cost, ASE Linux Express edition allows deployments on Linux with up to 5 GB of data, using up to 2 GB of RAM and 1 CPU in system resources.

Available with more options is the Sybase ASE Small Business Edition. This edition is ideal for the small to medium-sized business, supporting up to 256 simultaneous connections on up to four CPUs and supporting some of ASE’s Enterprise Edition’s most popular options.

The Sybase ASE Enterprise Edition supports the most demanding needs of relational database management. Supporting up to 64 processors, Sybase ASE Enterprise Edition can tackle virtually any task. Sybase ASE Enterprise Edition also supports enterprise class options for distributed computing and high availability.
The following chart provides a detailed comparison of ASE editions:

<table>
<thead>
<tr>
<th>Licensing &amp; Availability</th>
<th>EXPRESS EDITION</th>
<th>DEVELOPERS EDITION</th>
<th>SMALL BUSINESS EDITION</th>
<th>ENTERPRISE EDITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available for FREE Download on the web</td>
<td>Yes &amp;</td>
<td>Yes #</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Available for purchase on eShop.sybase.com or Sybase Sales</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Use for Development &amp; Testing</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes+</td>
<td>Yes+</td>
</tr>
<tr>
<td>Use for Deployment of Production Applications</td>
<td>Yes</td>
<td>No</td>
<td>Yes+</td>
<td>Yes+</td>
</tr>
<tr>
<td>Use for Embedding in Applications and redistribution</td>
<td>No</td>
<td>No</td>
<td>Yes+</td>
<td>Yes+</td>
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</table>

<table>
<thead>
<tr>
<th>Scalability</th>
<th>EXPRESS EDITION</th>
<th>DEVELOPERS EDITION</th>
<th>SMALL BUSINESS EDITION</th>
<th>ENTERPRISE EDITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Number of CPUs/Engines</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>No Limit^</td>
</tr>
<tr>
<td>Max Memory Size</td>
<td>2 GB</td>
<td>No Limit^</td>
<td>No Limit^</td>
<td>No Limit^</td>
</tr>
<tr>
<td>Max Database Size</td>
<td>5 GB</td>
<td>No Limit^</td>
<td>No Limit^</td>
<td>No Limit^</td>
</tr>
<tr>
<td>Max Number of Concurrent Connections</td>
<td>No Limit^</td>
<td>5</td>
<td>256</td>
<td>No Limit^</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ASE Systems Management Suite</th>
<th>EXPRESS EDITION</th>
<th>DEVELOPERS EDITION</th>
<th>SMALL BUSINESS EDITION</th>
<th>ENTERPRISE EDITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>DB X-Ray</td>
<td>Available</td>
<td>Available</td>
<td>Available</td>
<td>Available</td>
</tr>
<tr>
<td>DB Expert</td>
<td>Available</td>
<td>Available</td>
<td>Available</td>
<td>Available</td>
</tr>
<tr>
<td>SQL Expert</td>
<td>Available</td>
<td>Available</td>
<td>Available</td>
<td>Available</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Options and Option Packages</th>
<th>EXPRESS EDITION</th>
<th>DEVELOPERS EDITION</th>
<th>SMALL BUSINESS EDITION</th>
<th>ENTERPRISE EDITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SML Management Package</td>
<td>Included</td>
<td>Available</td>
<td>Available</td>
<td>Available</td>
</tr>
<tr>
<td>Content Management Package</td>
<td>Included</td>
<td>Available</td>
<td>Available</td>
<td>Available</td>
</tr>
<tr>
<td>Security &amp; Directory Services Package</td>
<td>Included</td>
<td>Available</td>
<td>Available</td>
<td>Available</td>
</tr>
<tr>
<td>Web Services</td>
<td>Included</td>
<td>Available</td>
<td>Available</td>
<td>Available</td>
</tr>
<tr>
<td>Enhanced File Text Search</td>
<td>Included</td>
<td>Available</td>
<td>Available</td>
<td>Available</td>
</tr>
<tr>
<td>High Availability</td>
<td>Included</td>
<td>Available</td>
<td>Available</td>
<td>Available</td>
</tr>
<tr>
<td>DTM</td>
<td>Included</td>
<td>Available</td>
<td>Available</td>
<td>Available</td>
</tr>
<tr>
<td>Disaster Recovery</td>
<td>Included</td>
<td>Available</td>
<td>Available</td>
<td>Available</td>
</tr>
</tbody>
</table>

Available indicates that the option is available for purchase
Included indicates that the feature is included in the base version and no additional licensing is required
^ Subject to ASE architectural limitations
+ Upon paying and acquiring the required licenses
& Linux platform only
# Linux, Windows, Solariss86, MacOSX platforms only
TECHNICAL SPECIFICATIONS

1.1 PLATFORMS SUPPORTED
Compaq Tru64 HP/UX (32 & 64 bit) Linux (32 & 64 bit)
IBM AIX (32 & 64 bit) Microsoft Windows NT/2000 Mac OSX
SGI IRIX (32 & 64 bit) Sun Solaris (32 & 64 bit)

1.2 HIGH AVAILABILITY
Hardware/Software Supported
Compaq – TruCluster IBM – HACMP Sun – Sun Cluster
HP – ServiceGuard Windows NT – Microsoft Cluster Software (MSCS)
Veritas Cluster Software SGI FailSafe

1.3 SECURITY
1.3.1 Authentication
LDAP PAM Active Directory
Native Kerberos MIT Kerberos CyberSafe

1.3.2 Encryption
FIPS 140 certified algorithms for SSL encryption

1.4 SERVER SPECIFICATIONS
1.4.1 Database Statistics (Maximum)
Databases per Adaptive Server Enterprise .....................32,767
Server Size ................................................. 8 terabytes
Database size .............................................. 4 terabytes
Page Size .................................................... 2K, 4K, 8K, 16K
Databases spanned by one update .............................16
Databases opened by one transaction .........................16
Tables in a query .............................................50
Logins per server .............................................2,147,516,416
Users per database ...........................................2,146,484,223
Groups per database ........................................1,032,193
Columns per table ..........................................1024
Arguments to stored procedure ..............................2048

1.4.2 Locking
Row Level Locking Page Level Locking Data Page Locking
Table Level Locking All Page Locking

1.4.3 Datatype Statistics
1.3.3.1 Binary Large Objects (BLOB) (Maximum)
Text ......................... 2 GB
Image .......................... 2 GB

1.4.3.2 Character (Maximum)
Char(n) ....................... up to 16384 bytes
Varchar(n) ................. up to 16384 bytes

1.4.3.3 Numeric (Maximum)
Int ............................................. +/-2,147,483,647 integer range
Smallint .......................... +/-32,767 integer range
Tinyint . ....................... between 0 and 255 inclusive
Float ............................... 8 byte floating point number
Shortfloat .................... 4 byte floating point number
Decimal, numeric .......... 38 digits
Double precision .......... 8 byte floating point number
Money ................................. between +/-922,337,203,685,447,5807

1.5 INTERNATIONAL SUPPORT
Localized releases in:
French German Spanish Simplified
Chinese Japanese Korean
Polish Thai Brazilian-Portuguese

Character Sets: 45 plus character sets including Unicode

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