

Contemplating VAX to Alpha Migration

by Bryan Holland

So you are considering migrating from VAX to Alpha but hesitate? You have many questions about it with no answers in sight. This article should help to address some of those questions and ease your mind.

THE END OF DBMS PERFORMANCE PROBLEMS

The time for Alpha/AXP has come! Yes, you may be able to squeeze some additional performance from your VAX systems... but if you really want your applications to run *fast*, then your plans must include Alphas. These machines are *fast*, reliable and very cost effective. Fortunately, the migration path may be easier than you think, and your savings on maintenance may even make the bean-counters smile. And to top that, your performance problems may be over!

MIGRATION IS EASY

VMS is VMS (for what it is worth, VMS = OpenVMS). OpenVMS on the VAX is really the same operating system as OpenVMS on the Alpha. No database changes are required to your CODASYL DBMS and Rdb/VMS databases to run on an

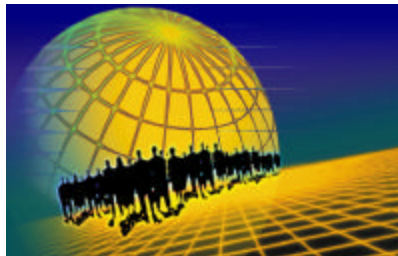
(Continued on page 7)



What's your database speed?

SCI Launches New Web Site

The website was quickly becoming extinct, compelling us at SCI to take action! That is exactly what we did by recently launching a sleek, redesigned Web site. "We are very excited about our progress and upgrades to the web site. Realizing the need for a more user friendly, eye-pleasing design with expanded database information and services. We look at this as another way to facilitate our improvements and broaden service to clients throughout the world," says Lisa Zerr, Business



Visit our new Web site at www.sciinc.com

Manager at SCI. In addition to the restructuring, other changes to the Web site include; comprehensive training course information, extensive technical resource section, detailed products and service section, and coming soon a section devoted to Informix. If you would like to learn more about SCI and how we can help with your database management needs, call us toll-free at 1-866-DBAdmin (322-3646) or visit our redesigned Web site at www.sciinc.com.

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SPECIAL POINTS OF INTEREST:

- *SCI launches redesigned Web site*
- *New employee joins SCI team*
- *Online Restructuring*
- *Oracle offers upgrades without support*
- *Relational vs. Network, how the choice affects your bottom line*
- *Spring training class schedule*
- *Inside this issue is a copy of SCI's new Mini-Brochure*



Database Management 101 by Kevin Bickerdike

Database Backups - Complete Waste of Time!?!?

Maybe, but only if you are *very* lucky! 99.9% of the database backups will be a waste of time, but if you need that 0.1% then all your work will have been worthwhile. You will be grateful for your backup strategy and the added fact that you will be able to keep your current position. Remember, as we say, if you did not take backups (or can't locate it) when you need one to recover your data, "You can't buy one!"

VMS backup is an efficient tool, but not recommended for your database backups. The DBO/BACKUP utility is much more efficient, backing up only the pages that are in use and ignoring free space. DBO/BACKUP also utilizes information in the root file to determine the location of all database files. This ensures a consistent backup of the entire database. Therefore, your backup will be quicker and smaller (your restore will also be quicker). DBO/BACKUP can be run online (if snapshots are enabled). The root file and all storage area files (your data) are backed up, but the snapshots are not. Incremental backups are fast too as they do not have to read every page. However, if a lot of changes have been made since the last full backup, an incremental backup can actually take longer than a full backup. If more than 10% of the database has changed since the last full backup then it is probably more efficient to perform another full backup. It can also mean a longer restore time. The



Database backups making you crazy?

multithreaded backup facility has been optimized to backup to tape - in fact, the more tapes the better! By using DBO/BACKUP/MULTITHREAD database areas can be backed up simultaneously. This is advantageous if you are running the backup to several tapes on several different tape devices. It is also good for disk to disk backups. It can speed up large database backups considerably, if the areas are roughly the same size, otherwise it is only as quick as it takes to backup the largest area (like the WIPLTH_AREA in WorkStream, or the MTRAREA in MANMAN).

After Image Journals are optional, but we strongly recommend their use. If you don't use AIJ's and your database needs to be restored then all data since the last backup will be lost. AIJ's also allow a corrupt page to be restored online using backups and AIJ's. If there were no AIJ's, a complete restore would be the only solution (with lost data - not a good option...if you like your job). They allow a roll forward of all committed transactions and the

overhead is minimal. In some cases the AIJ's can be optimized before they are applied making the "roll forward" process very efficient. The AIJ optimization process removes all transactions that were rolled back, multiple updates of the same record are removed leaving only the latest. The database records to be updated are sorted by dbkey.

Things to consider when deciding on a backup strategy: Cost of downtime, size of the database, transaction volumes, tolerance for potential lost data.

If you have high-availability requirements, SCI has a better solution than the old traditional full, incremental and AIJ backups - a hot standby database. The hot-standby database is a copy of the production database that is kept in sync with the production database using transactions captured in the after image journal files. With hot standby enabled, a catastrophic failure of the production database does not have to be catastrophic to your business! Besides the obvious "disaster recovery" benefit, our hot-standby solution allows us to offload much of the database maintenance overhead to the hot-standby database. 🕒

DBAdvisor

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SCI's Celebrity Photographer—Kevin Bickerdike

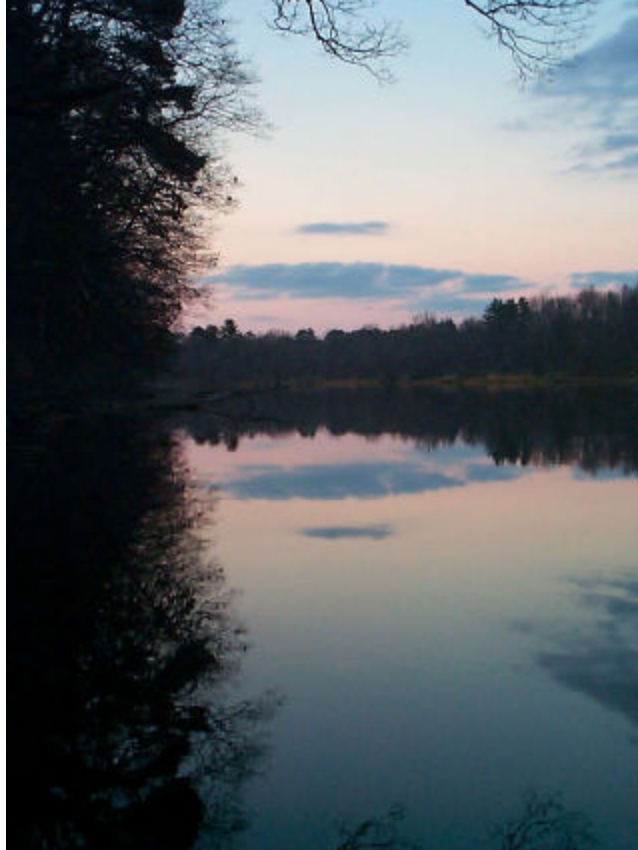
Did you know we have an *International Internet Photographer Celebrity* on staff? Neither did we when we hired him back in 1999. Kevin Bickerdike's - an SCI's Database Support Analyst - photographs have been published in the USA at Weather.com and NH.com as well as The Daily Record, a national newspaper in Scotland. We even have staff and clients use his photographs as their desktop wallpaper.

Kevin can be spotted throughout the area always sporting his camera. In fact, he is such an avid photographer that he's just upgraded his digital camera for another top-of-the-line digital camera. He likes to take pictures of his family (wife, Jean and teen-aged daughter, Kate), pets (one dog and one cat), and most of all - landscape pictures, which he is so famous for on the Internet (see photo at right).

So if you would like to have one of Kevin's distinguished photographs to use as your desktop wallpaper, email him at bickerdike@sciinc.com. In his spare time, Kevin also enjoys reading, bike riding and exploring new places.

SCI will soon have some New Hampshire and New England pictures on our revised Web site which will include many of Kevin's gorgeous full-color landscape pictures! It's so nice to have someone with such a great eye and natural gift of visual talent who happens to be a great database techie. 

View of the Merrimack River, NH, USA



Training Course Schedule

SCI offers CODASYL DBMS training in several areas. Courses are held at our Nashua, New Hampshire facility. All SCI courses are taught by experienced professionals in CODASYL technology. Below are the training courses scheduled for Spring 2001. More training course information and course syllabuses are available on our website at www.sciinc.com.

DBA Administration

5-day Course
April 23 - 27, 2001

DBA Performance

3-day Course
May 16 - 18, 2001

Database Programming


5-day Course
April 30 - May 4, 2001

Internals & Data Structures

4-day Course
May 21 - 24, 2001



SCI's Training Room in Nashua, NH

Call SCI today at (603) 879-9022 x120 to secure a spot in one of these upcoming training courses. **Remember seating is limited, so call now!** 

Database Schema Changes (Not as tough as you thought)

By Kanya Chinawong

SCI recently implemented a schema change for a leading provider of MES (Manufacturing Execution Systems) that enhances database performance and provides new functionality. Besides the obvious requirement “modify the schema,” the changes had to be designed to eliminate any downtime for the change and minimal code changes. Could it be done? Well, almost – the changes will require less than 5 minutes of downtime to implement!

Many DBMS developers take great pains to avoid the dreaded “schema change.” But why are they so afraid? Believe it or not, extensive schema changes are possible and do not require significant downtime to implement. We proved that schema changes do not mean extensive downtime or application changes.

The requirement was to add new fields to the database (easy, this involves only a change to the metadata), and to modify the sort keys of existing sets. The later requires that the existing index structures (data) be modified to reflect the new sort key – at some sites, this may involve updating millions of records. The database restructuring utility (DRU) allows sort keys to be changed – but requires more downtime than allowed. So, how did SCI design the schema enhancements so they could be accomplished in less than 5 minutes of total downtime? Here’s how...

To accomplish this, we needed to devise a plan to avoid changes requiring offline modification of data. Thus, we could only add new fields & sets and limit changes to existing sets to “metadata-only” changes (such as changing the insertion & retention modes).

Adding the new fields was easy. Simply extract the schema(s) definitions from the database, add the fields and update the database with the revised schema(s). Total downtime: approximately 1 minute.

To accomplish the “set change,” we created a new set with the new sort keys which we would later use an ALIAS clause in all subschemas to

effectively rename the new set using the old set’s name – this avoided the need to make extensive program changes. This set change was actually performed while adding the new fields.

A special program was needed that would connect all existing data into the new set – this could be run online. Once all existing records had been connected to the new set, the ALIAS clause was implemented allowing all existing programs to reference the new set with the old name (no program changes were required). At this point the application is now using the new set!

There were two sets that served essentially the same purpose at this point – the old set, and the new set. To avoid the overhead of maintaining BOTH sets, another metadata-only change was needed – changing the INSERTION mode to MANUAL and the RETENTION mode to OPTIONAL. This change

required another brief period of exclusive access to the database (less than 1 minute). Programs would no longer automatically connect new records to the old set – and we were free to disconnect the existing data from the old set!

To disconnect the old set, a temporary subschema was needed (remember, the existing subschemas have an ALIAS clause that points to the new set – the old set is “invisible” through these subschemas). This temporary subschema was actually added when we added the new field and set (at the beginning of the process). A special program was written that would disconnect the old set online.

Finally, once all of the existing data was disconnected from the old set, the temporary subschema was no longer needed. To remove this, we needed another moment of downtime – less than 1 minute to remove the temporary subschema.

Job accomplished! I said at the beginning that this was easy – in fact, this was a lot easier to perform than it was to describe! The easy part was the technical part – the hard part was writing this article! 🍌

Schema changes do not have to mean extensive downtime or application changes

SCI's Message Server *Behind the Scenes* by Chris Ward

SCI remotely manages and monitors mission-critical databases worldwide. Managing hundreds of databases around the world requires three key components; (1) a robust set of tools on the database server that performs all routine tasks and sends "messages" for all database events, (2) an equally robust set of tools reads the "messages" and takes appropriate action; and (3) a staff of database experts to monitor the activity of all databases worldwide!

When a customer subscribes to SCI's Remote Database Administration Service, we install our database server tools on their systems. Many customers do not realize that these tools are only half of the programs working hard to manage their database. At SCI headquarters, the Internal Systems Department maintains a room full of servers that interact with each other to process the information collected from our Remote DBA customers. This article explains one of these systems, the Message Server, a system that routes and tracks the status of all messages from our customer databases worldwide.

The Message Server is a critical link between the databases that we remotely manage and our database experts. To keep track of the health of a database, the tools installed on the database server send messages containing job status, performance data, errors, audit information and changes to the database environment to the Message Server. The Message Server takes these messages,

thousands per day, reads each one and acts according to the contents of the message.

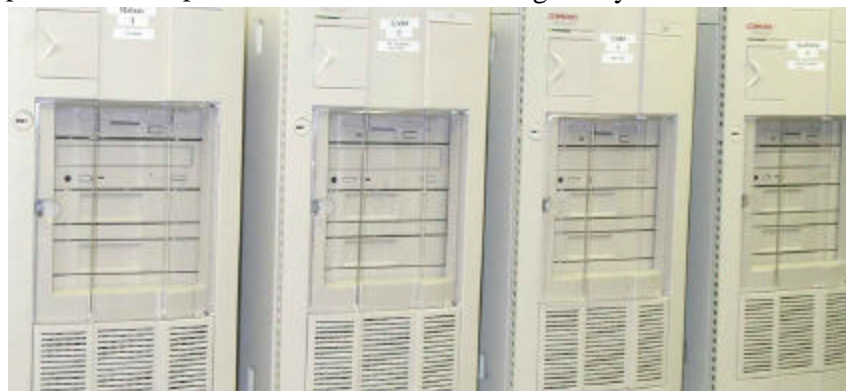
Some of the messages indicate that a certain process is running or has completed successfully. The Message Server keeps track of all these messages in a table and knows when to expect the next message. If these messages are not received when expected, it may indicate that a process is not running or that connection problems prevent messages from reaching us. In either case, SCI's staff verifies that the appropriate processes are running. SCI's technical support staff uses this information to make sure that the database and all related jobs are functioning as expected.

Other messages contain statistical information about the current state of the database. The Message Server loads this information into databases located at SCI. SCI's support analysts use this information to monitor changes to the database over time and to identify alarming trends. The forecasting capabilities of the message server allow SCI to predict performance problems before

they actually occur.

The final type of message that the Message Server receives are messages notifying the technical support staff that something needs to be looked at in a customer's database. There are different levels of priority for these messages. Usually these messages indicate some interesting or unusual event that our support technicians need to review, however, *some messages indicate "critical" events that require immediate attention!* For example, if we detect possible corruption in a database, an emergency message is sent. The Message Server uses DCOM to send a message our Voice Response System (see issue 6, Fall 1998). The Voice Response immediately contacts the correct support technician so they can begin diagnosing the problem.

The Message Server is just one of many systems that have been created by SCI's Internal Systems Department. Even though these systems are behind the scenes, programs like the Message Server are essential for SCI's support technicians to provide world-class service to clients globally. **O**



Close-up of SCI's Message Servers

Hints, Kinks & Work-Arounds

Q *What is the latest version of CODASYL DBMS and how do I get a copy of it?*

A The latest release of CODASYL DBMS is V7.0.3. You must order it directly from Oracle. The part number is "A86340-01 v4" (30-OCT-2000). However, this is now shipped as part of a "Rdb Family of Products CD-PACK." When ordering, be VERY insistent that this is not Oracle 8i; the key phrase is, "CODASYL DBMS V7.0.3 this is NOT ORACLE-7 or ORACLE 8i, this is part of the Rdb/VMS family of products."

Q *We upgraded from DBMS V6.1 to DBMS V7.0.3 (both multiversion.) After the upgrade, our application failed with the message "DBM-F-ROOTMAJVER, database format 70.1 is not compatible with software version 61.0. If we use "DBO/SHOW version," it shows "Executing DBO for Oracle CODASYL DBMS V7.0.3," so I am certain we ARE running DBMS V7.0. What's up?*

A This condition occurs because your programs were linked with the sharable image, DBMSHR61, rather than DBMSHR. This occurred because the link options file DBMDML61.OPT that was supplied with DBMS 6.1 included this reference. The work-around to this problem is to


define DBMSHR61 as DBMSHR70; "\$ define dbmsshr61 dbmsshr70."

Q *It appears that DBO/ANALYZE/ONLINE does not run as a "snapshot" (BATCH RETRIEVAL) transaction when used with the /NOSET qualifier. This appears inconsistent with other use of the "/ONLINE" qualifier, and in our environment this causes excessive stalls waiting for "snapshot cursor." Is this a bug or "feature?"*

A Yes, this is confusing, as is the documentation on this topic. The DBA Reference Manual (page 9-13) states "When you specify the /ONLINE qualifier, users can continue to update the database during the procedure. The online analysis procedure uses the snapshot file to retrieve the previous version of any record that has been modified since the analysis began." This seems to clearly state that the "/ONLINE" qualifier means it runs as a snapshot transaction (BATCH RETRIEVAL). However, the Maintenance and Performance Guide (page 14-3) states, "ANALYZE runs in PROTECTED RETRIEVAL mode while doing set analysis. (If you are not doing set analysis [/NOSET], DBO/ANALYZE runs in CONCURRENT RETRIEVAL mode.)" The short answer is that DBO always uses "CONCURRENT RETRIEVAL" (not BATCH RETRIEVAL) when

performing a /NOSET analysis. In large databases, this command may run for a long time (and thus cause long stalls waiting for the "snapshot cursor" lock.) As a work-around, try disabling deferred snapshots (\$DBO/MODIFY/SNAP=NODEFER <root>) or modifying the programs that are stalling so that they are also ready for CONCURRENT RETRIEVAL.

Q *We run DBMS V6.1.2 and periodically receive the message "DBM-F-TERMINATE," followed by a database shutdown. Why?*

A We have seen this at a few sites. The problem occurs due to a bug in the DBMDBR image that causes the recovery process to fail with an ACCVIO (access violation.) A patch is available from Oracle for DBMS V6.1, and this should be fixed in DBMS V7.0.3. 

Q & A

The *DBA*advisor welcomes your questions or comments for our Hints, Kinks & Work-Arounds section. You may submit them to DBAadvisor@sciinc.com. Note that we reserve the right to edit letters for clarity and brevity. Plus, receive a free gift for submitting a question or comment used in our publication.

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(Continued from page 1)

Alpha (the *same* database can be run on either an Alpha or a VAX, or both). This is important, because I believe that a lot of people are afraid of the word *migration*, and have avoided the move because they fear massive program changes, a database migration or an unfamiliar environment. The process of migration from VAX to Alpha is more similar to “move” than “migration.” Executables (.EXE files) are different, so your program will need to be recompiled and linked.

“NO-MOVE” MIGRATION


It is possible to migrate from VAX to Alpha *without moving any of your databases or user files*. To perform this style of a migration you must have a heterogeneous cluster (a cluster with both VAXes and Alphas) and you must create a new directory structure for the Alpha executables. Recompile and link your applications on the Alpha and you are ready to run on the Alpha. This approach has the benefit of avoiding the need to move files and provides access to your application (and data) from the old VAX environment.

However, this method fails to realize all of the benefits of your new hardware – a super-fast I/O bus, faster controllers and disk drives. If you are still on slow disks, slow controllers, and a slow bus...your performance may still suffer.

“FAST-MOVE” MIGRATION

Another approach to your migration is to move the entire system to the new architecture at one time. The benefit of this approach is that you can maximize your application performance by utilizing all new technology. Believe it or not, this can be done with minimal downtime when carefully planned. The key to this method is to use Software Concepts International’s hot-standby solution to maintain a synchronized copy of the production database on the Alpha prior to the migration. By using SCI’s hot-standby solution during a “fast-move migration,” a 50GB database can be moved with only minutes of downtime! SCI has also helped customers move non-database files with minimal downtime by utilizing a combination of full and incremental backups and restores over the network.

SUCCESSFUL MIGRATIONS

SCI has helped a number of large customers worldwide move their WorkStream and MANMAN applications from VAX to the Alphas. During most of these migrations, customers used our hot-standby solution since this provides a very fast migration and allows them to immediately take advantage of the new hardware. To see how your current VAX systems compare in performance to the Alpha systems, visit Compaq's WEB site: http://www5.compaq.com/alphaserver/performance/perf_tps.html. The numbers are truly impressive! 

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Focus On



Chris Ward, IS Manager.

Chris Ward

Chris joined the SCI team in 1996 as a part-time IS Administrator while finishing college in Pennsylvania. He finally came on board full-time after graduating in May, 1999. Since then he has been knee-deep in several of SCI's ongoing technology upgrades and projects, designing new ways for SCI to better serve its client base. At SCI he is in charge of our mission critical systems like the Voice Response System, email and Message Server Systems (see article on page 5). He brings strong organization and reasoning skills to SCI plus ability to think outside the box.

Chris' life outside of SCI involves spending time with his new wife and working on the house they recently purchased. He also enjoys racquetball, bicycling and sometimes even squeezes in time for reading about political subjects whenever he gets the opportunity. 

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