

Commentary

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Rethinking Database Recovery

The continual increase in storage requirements for database-enabled applications continues to put increasing data protection demands upon backup and recovery software. Faster performance is necessary to alleviate time pressures on backup windows. Meeting the demands of ever-higher service-level requirements (especially availability) requires knowing what the right response is, applying it at the right time, and applying it in an automated way to minimize service-level impacts. Finally, strengthened compliance requirements emphasize — with no uncertainty — the need for data integrity. BMC Recovery Manager for Databases delivers a backup-and-recovery services solution that meets all of these demands.

Laying Down the Gauntlet — the Challenges for Database Recovery

Losing one or more essential databases (or even parts thereof) is not only unacceptable; it is anathema. Those key databases represent the institutional memory of the enterprise. If an enterprise loses all or an important part of that memory, the enterprise does not know: who owes money to it, who it owes money to, who are its customers, how the company is doing financially, and how to respond to regulatory requirements.

Data protection, as a vital component of overall business continuity, is thus not just a “nice to have,” but a *must have*. That protection has to include both physical data protection — protection against physical loss, such as multiple disk drive failures or a fire — and logical data protection — protection against database corruption, accidental deletions, and other

unauthorized or unplanned database-altering I/Os. In addition, that protection has to extend to both data preservation (ensuring that data is always kept complete and accurate), and data availability (ensuring that end users have data access according to service-level requirements that may very well specify only minutes of unplanned downtime per year).

Although newer data protection technologies complement backup and recovery software, backup and recovery software typically remains the data protection bastion upon which enterprises rely. Yet there are a number of challenges that backup and recovery software has to be able to meet.

- Knowing what the impact of a problem could be. Effective problem diagnosis ensures the proper timing and level of response to effectively keep service high while at the same

Commentary

time using scarce administrator resources efficiently

- With shrinking backup windows, increased performance (i.e. for speeding up backups is essential)
- Recovery needs to be automated in order to maximize recovery speed and thus minimize the length of downtime; manual processes are simply too time consuming
- The need for compliance (e.g., Sarbanes-Oxley) has increased the need for data preservation; restores must be able to guarantee the integrity of the data restored

An enterprise must respond to all of these challenges. And that is where BMC Recovery Manager for Databases comes in.

The Added Value of BMC Recovery Manager for Databases

Backup and recovery software remains the foundation for both logical and physical data protection. For example, RAID and remote mirroring provide a complementary technology for physical data protection, but the fallback position — should those technologies fail — still remains backup and recovery software, as enterprises dare not put all their data protection eggs in one technology basket.

BMC Software offers BMC Recovery Manager for Databases as its IT infrastructure service for backup and recovery of distributed databases. In keeping with its heritage, BMC Software offers a robust, tried and true product that enables DBAs to get a good night's sleep.

Recovery Manager for Databases does a lot more than the everyday service of

backing up and restoring databases. It does that well, but the other features that it brings to the table are what deliver added value (Table 1).

BMC Recovery Manager for Databases has the same architecture and features as the more familiar SQL-BackTrack, although BMC Software offers them in different packages. BMC Recovery Manager for Databases has access to the

Table 1: Adding Value to Recovery Manager for Databases

| What? | How? | Why? |
|-------------|--|---|
| Service | Service Impact Manager Integration | Knowing the business impact of a problem is key to determining the proper response |
| Performance | Multiplexing, parallel streaming, striping and disk optimization | Dissolves the dilemma of not having enough time to do backups |
| Recovery | Guided Recovery | Providing automated help in recovery minimizes service-level impacts |
| Compliance | Enterprise Policy Monitor | Having the proper policies and procedures for backup and recovery to ensure data integrity is a necessity |

Source: Mesabi Group September 2006

entire suite of databases that SQL-BackTrack supports, including Oracle, DB2, SQL Server, and Sybase.

Service Impact and Recovery

Although Recovery Manager for Databases can be effectively run as an independent software application, Recovery Manager for Databases is even more effective when working in concert with other BMC Software solutions, notably the Service Impact Manager (SIM). Recall that backup and recovery is an IT data protection service. A service has to meet service-level objectives (SLOs), such as the acceptable level of downtime for an application and what, if any, data loss is acceptable.

BMC Recovery Manager for Databases can detect events that affect its operation, such as the failure of a backup job midway through its execution. Recovery Manager can communicate that information to another application (say the BMC Event Manager that communicates to SIM) or to a person. But that simply answers the question of what is happening. The next question is: does it matter? In other words, is the event likely to have any impact on service levels for applications that the enterprise deeply cares about? And what should the response be — an immediate fire-drill emergency response, a closer monitoring to see if a trend in a particular direction (say network congestion) will intensify to a level where action is required, or a let-it-wait-until-morning, when the DBA can take long-term corrective action?

Enter SIM. Service Impact Manager enables enterprises to align their IT services with their business process

priorities. With SIM, the enterprise can identify the relationships among the components of the IT infrastructure, including related applications and their supporting systems and databases as well as hardware. Those components can then be correlated to the service level objectives of the different business processes. Systems-level monitoring can tie operational events to the supported business services through impact analysis.

SIM can thus help in the troubleshooting what-can-be-done-about-the-problem phase. Through visual inspection and drill-down analytical capabilities, a DBA or IT administrator (depending upon the nature of the problem) can perform a root-cause analysis. Finding the cause of the “disease” and fixing it is much more effective than treating the symptoms.

SIM illustrates the action side of BMC’s overarching strategy, Business Service Management (BSM). BSM stresses the interlocking relationships among people, processes, and technology that are required to generate business value from information technology. Without using principles such as BSM, IT organizations cannot evolve to become more efficient and effective at service provision. Using Recovery Manager in conjunction with SIM is one of the proof points that demonstrate the concepts of BSM.

No More Running Out of Night (and Day)

Days are not becoming any longer, despite what IT organizations would wish, but Recovery Manager can get more out of each day so that IT does not have to wish that days were longer.

The continued growth in the size and complexity of databases continues to put

increasing pressure on the ability to complete backups in a timely fashion.

The faster backups are done the better. Not only does that relieve the worry about running out of night (and day), but it provides extra (and thus valuable) time to respond to events (through the service impact manager integration) before unnecessary problems occur, such as an unrecoverable-in-time failure to complete a critical backup. Moreover, IT administrators have the time to allow for some network congestion or recover from a tape drive failure.

Therefore, when it comes to backups (and restores), no substitute for sheer speed is acceptable. Two of the notable approaches that Recovery Manager for Databases takes to turbocharge performance are *multiplexing* and *disk optimization*.

The Recovery Manager backup process consists of two modules — one to generate backup data and the second to write that backup data to storage. However, a single backup-data-generating process cannot always transfer data at fast enough speeds to prevent the write-to-storage process from being idle a good deal of the time. The answer to that is multiplexing; that is, creating multiple backup-data-generating processes simultaneously that can prevent the write-to-storage process from being idle. This maximizes the throughput to a single piece of storage media and reduces backup time — usually significantly.

In addition, multiplexing is the fastest way to recover from logical (e.g., data block corruption) errors. Since there are multiple backup-data-generating processes being run simultaneously,

more data can be processed in the same period of time than before. Therefore, logical errors can be found and addressed earlier than would have been the case otherwise.

Disk optimization takes a different tack. Data files may be distributed across multiple disks, but a standard backup approach typically backs up only one disk at a time. That leaves the other disks that contain database data for the backup idle; obviously, this approach is inefficient. Disk optimization is the process of being able to read from all the disks simultaneously. Keeping the spindles on all disks active optimizes access and, of course, reduces backup time — again possibly significantly.

Multiplexing and disk optimization — together as a dynamic duo — optimize both the ability to read data from a single disk and across multiple disks.

Recovery Made Easy Through Guided Recovery

The purpose of doing backups is so that recovery can take place whenever necessary. Performing recovery rapidly and flawlessly is the key to minimizing the impact of SLO-threatening downtime. BMC Recovery Manager for Databases includes an interactive tool facility called guided recovery that makes recovery a simpler and more robust process.

Guided recovery has internalized the options and the correct sequence of tasks that are needed for each option to restore databases as desired. Guided recovery asks a DBA a series of questions to which even junior level people can give answers with confidence (which is good if a more experienced person is not available).

BMC Software claims that the think time for a DBA can be reduced 2 to 10 times by using guided recovery. That is probably conservative, especially when a database is corrupted at the worst possible time since speed of action is even more important then. And native database utilities can only deal with simple recovery, not a very complicated recovery such as an untimely database corruption.

Moreover, DBAs are not typically recovery experts — nor do they want to be. Recovery has to be in a very specific sequence, such as when a control file needs to be restored. A DBA should appreciate being able to marry his/her knowledge with the knowledge of guided recovery in order to be able to avoid having to consult a manual in a time-pressured-packed “when-will-my-system-be-back-up” situation.

Not only does this simplify the recovery process for DBAs, but the process can be used for operational (i.e. day-to-day) recoveries both small and large in addition to the infrequent (hopefully never) major disaster recoveries. The result is happier end users whose database applications stay up longer and happier DBAs who can spend more time in productive tasks that move things forward and not just corrective tasks to repair data damage.

Staying on the Right Side of the Law

The Sarbanes-Oxley Act requires publicly-traded companies to monitor and verify the authenticity of financial records. To ensure that compliance is not an option, but a mandate, the CEOs and CFOs of such companies are held personally accountable.

Provisions of the act require that there be no destruction, alteration, or falsification of records and that each company establish and maintain an adequate internal control structure and procedures for financial reporting that also contains an assessment of the effectiveness of that approach.

Proper backup and recovery policies, practices, and procedures are a vital part of that internal control structure. In order to comply with the provisions of the act, an enterprise must be able to completely and accurately recover all required data in the event of a logical or physical failure that affects one or more production applications. No loss of data that would invalidate the integrity of the financial reports is acceptable.

Databases are particularly affected, as the revenue and cost transactions of any enterprise flow through a number of systems, including, but not limited to, order entry, billing, accounts receivable, and accounts payable.

Using Recovery Manager for Databases in conjunction with its Enterprise Policy Monitor (EPM), a separate interface for monitoring backup and recovery jobs, a DBA can perform the policy management that is essential for compliance. EPM enables an administrator to define SLOs and then audit them to determine whether or not those objectives are being met. That is critical in ensuring that the requirements that Sarbanes-Oxley demands are completely and thoroughly met.

Conclusion

Are things getting any easier with respect to data protection for databases? No IT organization would likely be able to say yes.

Commentary

The message though is that just doing the basics is not enough anymore. Nominally, backup and recovery software has to do the basic tasks of backing up and restoring databases. But how well those tasks are done and how else the solution helps in meeting ever-higher service-level objectives determines the added value of a backup and recovery service solution.

Enterprises demand more. How does an enterprise:

- *Know what the proper response is to a problem is and when to apply it?* Recovery Manager for Databases answers that question with its integration with Service Impact Manager.
- *Get around the time pressures surrounding backups?* Better performance using multiplexing and disk optimization is Recovery Manager's answer to that question.
- *"Make everything as simple as possible, but not simpler" [with thanks to Albert Einstein] in the recovery process?* Guided recovery as a capability in Recovery Manager answers that question.
- *Meet the key data integrity compliance requirements of Sarbanes-Oxley?* Using Recovery Manager in conjunction with Enterprise Policy Manager fulfills this obligation.

Enterprises that need the added value in their backup and recovery service solution to meet these increased demands for data protection for databases should look carefully at BMC Recovery Manager for Databases.

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