

# The White Papers

## **Reducing Downtime During a Consolidation**

*Moving Your IT Infrastructure Forward with Advanced  
Application Consolidation Tools and Best Practices*

**Quest Software**

## Contents

---

<b>Introduction .....</b>	<b>3</b>
<b>Overcoming a Fragmented IT Infrastructure .....</b>	<b>3</b>
<b>Consolidation as a Strategic Solution .....</b>	<b>3</b>
<b>Varying Degrees of Consolidation .....</b>	<b>4</b>
<b>Consolidation Challenges.....</b>	<b>4</b>
<b>The Spectrum of Consolidation Approaches .....</b>	<b>5</b>
<b>Best Practices Step 1: Make a Comprehensive, Accurate Assessment of the Existing Environment .....</b>	<b>6</b>
<b>Best Practices Step 2: Execute a Seamless Migration and Consolidation.....</b>	<b>7</b>
<b>Best Practices Step 3: Streamline Ongoing Management of Consolidated Systems.....</b>	<b>8</b>
<b>Summary .....</b>	<b>10</b>
<b>About Quest Software.....</b>	<b>10</b>

# Reducing Downtime During a Consolidation

Quest Software

---

## Introduction

Organizations today are suffering the effects of proliferating — and often conflicting — hardware platforms, databases and applications. Many choose to evolve their IT infrastructure and reduce their total cost of ownership (TCO) through hardware and application consolidation. Of these options, application consolidation is the most complex, yet promises the highest return. Done properly, application consolidation can propel an IT infrastructure toward enterprise application integration (EAI) and extensible Web-service architectures that make e-business more viable.

Because application integration poses many technical challenges and potential business risks, IT professionals are wise to seek out consolidation best practices and field-proven tools to reduce or eliminate risk and accelerate the return on investment. This white paper discusses several typical initiatives by which a company can simplify its IT infrastructure and reduce costs through system consolidation with a focus on secure, seamless application consolidation and ongoing application management.

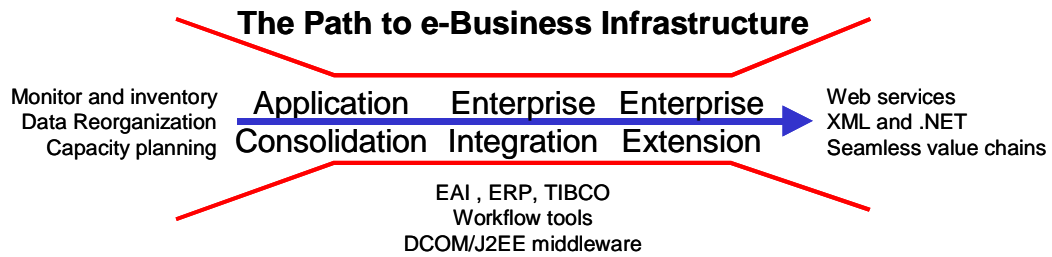
## Overcoming a Fragmented IT Infrastructure

Today's enterprises are beset with a patchwork of legacy applications, mainframes, client/server architectures, UNIX databases, Microsoft NT servers and emerging distributed (N-tier) architectures. Another common enterprise nightmare is the management of hundreds or thousands of departmental and application servers that cannot be viewed or managed by a central administration function. Ultimately, strategic CRM, business intelligence, supply chain and B2B e-commerce initiatives will not attain their potential unless enterprises can move their data and applications into more manageable IT architectures.

## Consolidation as a Strategic Solution

For cost-conscious organizations, consolidation is a practical undertaking. Regardless of their size or industry, enterprises will also find that a successful consolidation effort has a strategic payoff that exceeds the operational and cost benefits. Consolidation is a fundamental enabler of enterprise integration and an important milestone on the road to extensible enterprises that participate in agile e-business-enabled value chains. It is a pressing issue for large corporations that are going through major restructuring activities and is highly relevant to SME companies grappling with the spiraling costs that accompany chronic server sprawl.

Consolidation should not only deliver significant cost savings; but ideally it should also align a firm's internal IT infrastructure with its operations and its business plan. A well-planned and -executed application consolidation will result in a more efficient and unified IT architecture that facilitates ongoing enterprise application integration (EAI) projects and, ultimately, seamless business relationships via Web services (see Figure 1). According to Gartner analyst Ray Paquet, "Strategic enterprise integration efforts are by nature complex. Integration without consolidation compounds complexity, reducing the likelihood of success."



**Figure 1: Consolidation is the first step on the path to an advanced e-Business infrastructure.**

## Varying Degrees of Consolidation

For some companies the primary goal is hardware consolidation. This primary step can provide immediate cost savings and operational benefits via a centralized server and storage infrastructure. But for companies that suffer from an excessive proliferation of operating systems and application installations, the biggest payoff is found in the realm of application consolidation.

Application consolidation appeals to both executive and technical management because a strong, flexible application infrastructure is a competitive weapon that enables new business solutions and improved customer value propositions. From a financial and operational viewpoint, application consolidation can bring even greater savings and operational efficiencies than hardware consolidation. It can greatly reduce the number of databases, mail servers and application programs that must be maintained and managed throughout the enterprise. In addition, it can lead to a more manageable IT architecture that accelerates progress toward EAI and Web services.

In the final analysis, the strategic case for application consolidation is one of common sense: An organization can attempt to integrate and extend an enterprise architecture based upon a collection of unstructured mail, database and application servers dispersed across the enterprise. On the other hand, it can integrate based upon a foundation of several large, centrally administered data center servers. The most feasible choice is clear, but it poses several challenges.

## Consolidation Challenges

The consolidation of scattered servers, databases and mission critical programs can be complex and challenging because it requires reengineering of vital production applications that will not tolerate disruption or degradation. Without advanced application management tools, consolidation can upset key business processes and hamper end user productivity. Jeopardizing internal productivity and/or customer transactions will obviously undermine the anticipated cost savings and operational benefits of consolidation.

Given the right tools and practices, application consolidation can be accomplished without painful surprises. Below, this paper discusses the spectrum of consolidation approaches, ranging from simplest to most complex, and the best practices and field-proven tools that will maximize the payoffs and minimize the pitfalls of a strategic application consolidation effort.

## Application Consolidation in the Balance

### The Potential Payoffs

- Reduced TCO
- Better application performance
- Better data visibility and customer analytics
- Better security via centralized controls
- Higher application availability and reliability
- Centralized backup, archive, and disaster recovery
- Facilitates enterprise integration for greater business process flexibility and agility

### The Potential Pitfalls

- High short-term labor costs due to migration complexities
- Loss of data or loss of access to data during migration
- Loss of configurations and settings
- Loss of security controls after migration
- Possible performance decline or disruption declines due to cross-application interaction
- Potential central point of failure and bottleneck on the post-consolidation system

## The Spectrum of Consolidation Approaches

Several different types of consolidation are in use today, ranging from simple server relocation to full-blown IT architecture restructuring. Hardware centralization is the simplest and most straightforward and lays the foundation for future software reorganization. In this approach, applications are simply moved without modification to a larger data center for increased performance, security and lower costs. Both the anticipated benefits and the complexity are greatest when hardware and software are simultaneously consolidated and aligned with business requirements. From simplest to most advanced, the spectrum of consolidation approaches includes the following:

### Server Centralization

This approach entails relocating scattered, decentralized departmental and workgroup servers to data centers. The server count remains the same, as does the number of applications. Centralization preserves the existing application architecture, lowers support costs and simplifies systems management.

### Server and Storage Consolidation

In this slightly more complex scenario, a few data-center class servers replace many smaller servers. More users per server can greatly reduce the total cost of systems management and storage. Fewer servers can equate to a lower fixed maintenance cost and fewer software licenses. Additionally, a controlled data center environment and centralized server administration can lead to higher availability, better disaster recovery and security. This approach can also encompass a move to centralized NAS or SAN storage. Overall network complexity is reduced because numerous server-to-server connections are eliminated through the enterprise topology.

### Microsoft Windows Infrastructure Consolidation

This approach consists of consolidating highly distributed “first-generation” NT mail and file servers onto powerful Windows 2000 and Active Directory platforms, which provide cost effective centralized management and better performance, security and reliability. For enterprises struggling with hundreds or thousands of small, poorly managed NT and Exchange servers, application proliferation is very costly in terms of downtime, security vulnerabilities and poorly utilized server resources. Moving Windows file, mail, print and database services into the enterprise data center is a necessary step towards a robust, highly available IT infrastructure.

## Application and Database Consolidation

As discussed above, the “ultimate” form of consolidation involves the consolidation of enterprise or line-of-business (LOB) applications such as Siebel, Oracle, PeopleSoft, SAP and databases such as Oracle, DB2, SQL Server and Sybase. In this scenario, an organization restructures diverse databases and applications onto a few centralized servers that can take advantage of fail-safe clustering and symmetrical multiprocessing (SMP) platforms. This initiative is more complex than NT mail and file server consolidation but also offers the biggest potential benefit in terms of lower costs and increased business performance. The cost benefits from application consolidation can exceed the savings of server consolidations. In fact, if everything goes correctly, application consolidation can reduce the total cost of ownership up to 20 percent or more.

For all application environments, there are three essential stages of consolidation: 1) pre-consolidation assessment; 2) replication and migration during actual consolidation; and 3) post-consolidation management.

As a leading provider of advanced application management tools, Quest Software speaks from experience on the challenges and benefits of Windows infrastructure consolidation and enterprise software & database consolidation. Below, Quest Software’s customers and engineers provide step-by-step best practice recommendations to ensure that consolidation efforts deliver as expected.

## Best Practices Step 1: Make a Comprehensive, Accurate Assessment of the Existing Environment

The success of an application consolidation project largely depends on the quality of the system inventories, benchmarking and capacity planning that take place before the actual migration. Consolidation is viable only if a highly accurate picture of the existing applications, operating systems, server resources and administrative settings is obtained.

When pre-auditing an environment, it is imperative to seek out dead files, dead accounts, duplication of databases, unneeded voice/video files and other space-hogging obsolete data. Much can be gained by shaking out existing data. Although such “spring cleaning” is perceived as tedious, with the right tools it is simple. This process also provides a good opportunity to archive some of the data, move old “business-intelligence” data to operational data stores or directly to the data warehouse and finally purge it from the production database. It’s also critical to evaluate the application’s I/O workload. Configuring the new disk sub-system may have cross-application impact, and it is important to understand the I/O needs of specific applications before consolidation takes place.

For both a comprehensive pre-migration inventory and capacity planning prior to major application and/or database consolidations, Quest Software’s **Foglight**<sup>®</sup> provides full technology-stack monitoring and reporting. Foglight monitors and reports on operational and administrative aspects of Oracle, Microsoft SQL Server and Sybase databases, including memory use, network use, database space, security settings, performance and other key components. Foglight is also configurable for monitoring Siebel, SAP, PeopleSoft and other mission-critical applications to assess consolidation and migration issues before they become major problems.

Moving from the source system to the target system without proactive benchmarking opens a firm to considerable hazards. A common best practice is to load test a target system using the source system as the experimental “control” while using the same assessment and monitoring

tools. Quest Software's **Benchmark Factory**<sup>®</sup> works in conjunction with Foglight to test the capacity of both sides. Benchmark Factory will identify the peak capacity and saturation point of network connections, databases, operating systems, file servers and other critical components in the end-to-end application architecture. Together, Foglight and Benchmark Factory enable administrators to create accurate performance models for capacity planning purposes, so that the target consolidated system can be architected accurately.

When migrating from Windows NT to Windows 2000 servers, a full inventory of NT file systems, users, groups, domain structures and other distributed settings must be obtained. As with major application and database consolidations, a Windows domain consolidation is a unique opportunity to clean up poorly organized file systems, data structures, security settings and other legacies that shouldn't be migrated to the new system. Quest Software's **FastLane**<sup>®</sup> **Reporter** gives a comprehensive picture of existing NT-based server and application resources, Reporter's policy-based exception reporting helps administrators identify data and security anomalies that must be addressed early in the consolidation process.

When consolidating Oracle databases, an organization should strive to optimize the source data beforehand for best performance. However, this step is too frequently skipped because it typically requires your production database to go off-line. To minimize or eliminate the impact on production, **LiveReorg**<sup>®</sup> enables real-time, online data reorganizations using Quest Software's unique data replication technology. LiveReorg proactively restructures and reorganizes Oracle databases without disrupting business or requiring downtime during high-volume production hours. Using LiveReorg before a database consolidation ensures that an optimized database structure will be migrated to the consolidated system. LiveReorg is designed in particular for high-end enterprise and LOB applications that run on Oracle, including Oracle E-Business Suite, PeopleSoft, SAP and numerous high-end e-commerce applications.

### **The Right Tool for a Massive Data Reorganization Job**

Snap-on Incorporated is a leading manufacturer and marketer of professional tools and shop equipment. According to Jim Schwarz, Snap-On's Database Team Lead, "Our distribution centers process about \$1,000,000 per day, so our business will not allow us to have downtime. The Quest Software LiveReorg product allows us to recapture disk space with minimal downtime, allowing our distribution centers to continue to do business while we are reclaiming."

## **Best Practices Step 2: Execute a Seamless Migration and Consolidation**

Once an organization has performed a comprehensive audit, created a strategic plan and reorganized its data structures as necessary, it is prepared to execute the application consolidation/migration. In general, it's not always possible to schedule sufficient downtime for a complete "off-line" consolidation. Therefore, migration and cutover must usually take place gradually while production systems are in constant use. The safest way to achieve a seamless migration is to replicate existing databases and applications to a single consolidated copy on the target system. This "live copy" replica can then be tested until it is ready for production. After cutover, replicating the newly consolidated system back onto the original servers creates a safety net to fall back on. During migration and consolidation, if response times degrade considerably, it may be better to restrain the pace of the process.

With the proper application management tools, a project team can closely monitor and control all aspects of the consolidation process to ensure business continuity and data integrity. In the event of a database consolidation, to achieve more controlled migrations that are transparent to end users and applications, Quest Software's **SharePlex®** provides seamless Oracle data replication. The existing (source) system functions normally during migration while SharePlex captures and queues all transactions. When migration is complete, SharePlex applies logged transactions to the migrated (target) system, which is synchronized with the source. For highly fragmented or distributed organizations, SharePlex can replicate multiple smaller databases into a larger consolidated database while all source databases are in production, enabling seamless database consolidation.

Once users are cut over to the new system, SharePlex can be used to mirror transactions back onto the source system, which then functions as a convenient safety net in the event of a fault in the new system. SharePlex works in heterogeneous hardware environments that include Sun, HP, Compaq and IBM platforms. SharePlex database migration can take place over LAN or WAN connections, with automatic control of network traffic levels. This means that the large data transfers normally associated with consolidation will not disturb network users.

To ensure that consolidation is proceeding as it should, administrators require complete visibility into the full applications stack on a 24x7 basis. As a comprehensive application monitor throughout the migration phase, **Foglight** allows administrators to monitor and track vital activities in Web servers, operating systems, databases, storage systems and the network. During this pivotal phase, Foglight alerts administrators to potential application faults, allowing proactive management of availability and performance during consolidation.

In the Microsoft server environment, consolidation can be labor-intensive, time-consuming and risky. Furthermore, in this type of consolidation, the repercussions of performance problems and administrative conflicts are severe because thousands of end users may rely on the Windows or Exchange network for core daily tasks. Quest Software's **FastLane Migrator** performs incremental, seamless migrations of NT users, groups and computers to Windows 2000 Server and Active Directory while systems are running. Migrator greatly reduces the manual effort involved in a migration, so the process takes place rapidly and inexpensively.

Truly transparent consolidations create little or no impact on an infrastructure. In addition, they ideally will not require constant attention from the project team and therefore will not cause a drain on administrative resources. Quest Software's **FastLane Consolidator** facilitates a virtually hands-free server consolidation project because it enables automatic online movement of data, related security settings, and printers to larger servers or SAN/NAS devices. Consolidator was initially developed for Microsoft's own internal Information Technology Group (ITG) as it prepared to roll out Windows 2000. As Frank Holland, general manager, Microsoft ITG, tells it: "In order to consolidate servers and take full advantage of Windows 2000 TCO savings, we needed to move terabytes of data. FastLane Consolidator automated this time-consuming task, allowing us to migrate data more quickly."

### **Best Practices Step 3: Streamline Ongoing Management of Consolidated Systems**

After consolidation takes place, the same tools used in assessment, planning and migration should prove useful in ensuring that the target system is capable of meeting the mission-critical demands that are placed on it. Once again, it's critical to monitor against outages and I/O bottlenecks that may occur within the application and infrastructure components. Ideally, this is

the time to implement central administration policies regarding application, database and storage usage. Whenever possible, one should proactively monitor for application response degradation and anomalies before they incur downtime. In the event of bottlenecks or outages, it makes sense to have real-time diagnostic and tuning tools on hand that can enable extremely granular views of the system for faster resolution.

Once databases are consolidated and migrated, a resilient environment will consist of both production and replica systems to hedge against outages and to offload processing at peak times. **SharePlex** ensures that availability and performance do not degrade in the consolidated system. To ensure the highest levels of system availability, SharePlex can replicate a production database in real time and offload reporting to the replicated database, avoiding any degradation of transaction processing and LOB applications. If one replica is not sufficient, multiple real-time replicas can be maintained for a range of reporting, testing and migration purposes. SharePlex replication services are also used in high-end disaster recovery configurations, so that backup databases can be continuously refreshed and be online for immediate failover.

### **Ceridian Leverages SharePlex for Reliable Database Backup**

When Ceridian Corporation's Human Resource Solutions group migrated its payroll tax database from the HP e3000 to an HP 9000 running HP/UX and Oracle, SharePlex played a key role. After the migration, SharePlex is now employed to replicate the 300 GB production database in real time to a hot backup server in a remote data center.

Carl Hughes, Ceridian's data architect, describes SharePlex: "It's practically invisible and it uses very few resources... the performance is excellent but the user interface is simple and easy to use." When asked what level of confidence he has in the SharePlex hot backup, Mr. Hughes replies, "I'm absolutely confident. I have no doubt that our hot backup site is viable."

Evaluating a system's conformity to service levels is also critical after a consolidation. However, the system administrator's new burden includes not only monitoring I/O, but also correlating all of the various application performance counters to arrive at accurate conclusions about the overall performance of the integrated system. In this instance, **Foglight** suits the need for monitoring the consolidated system on an ongoing, remote, 24x7 basis. As an all-encompassing solution, Foglight allows administrators to centrally track all key performance metrics, ranging from application response times and transaction throughputs to CPU utilization levels. In the enterprise data center environment, Foglight's pre-configured best-practice notification and custom monitoring/alert rules let administrators quickly correlate information coming from all levels of the runtime stack. Foglight creates a data repository that contains a detailed history of system and software activities. This repository enables root-cause analysis during complex problem-resolution efforts. Many organizations have depended on Foglight to help them meet stringent service levels in the most demanding production environments.

At this point in the application consolidation process, the only remaining objectives are to minimize downtime and improve application and database performance. As a best practice, an application management team should identify low- or no-footprint tools to diagnose performance problems in real time. Once an unattended monitor such as Foglight has detected and notified the team of a performance problem, an administrator requires a lighter console-based tool on hand to examine the real-time "vital signs" of the afflicted application. Quest Software's **Spotlight**<sup>®</sup> is an advanced diagnostic and resolution tool that allows administrators to quickly identify and eliminate resource contention. Spotlight's patent-pending "dashboard"



interface exposes the architecture of the affected server or database and graphically displays, in real time, the actual processes and flow of data within the system. When Spotlight indicates a problem, administrators can drill down on the particular component and obtain in-depth information about the source of a problem and expert advice for resolution.

Of course, not all bottlenecks occur within the application server itself. When the source of the problem originates from the database, **Quest Central™** offers additional resolution capabilities. Quest Central is a powerful management console available for both Oracle and DB2 databases that provides tuning, space management, database administration and more from a single integrated interface.

## Summary

Application consolidation is highly desirable because of the advantages of potential reduced TCO and enterprise integration. However, application consolidation is also complex, not to mention potentially risky and disruptive to business. In the high-stakes pursuit of resilient and responsive IT services, the synergistic effects of Quest Software's application management products - Foglight, the FastLane Suite, Benchmark Factory, LiveReorg, SharePlex, Spotlight and Quest Central - enable enterprises to move rapidly and confidently towards an improved application infrastructure. Organizations will appreciate the financial benefits of consolidation, the improved performance of application infrastructures and the establishment of an extensible, integrated enterprise. Overburdened administrators can work more proactively and efficiently using field-proven products that encompass multiple phases of the consolidation and management cycle.

Please visit [www.quest.com](http://www.quest.com) for more in-depth information on the application management tools highlighted above.

## About Quest Software

Quest Software, Inc. (NASDAQ: QSFT) is a leading provider of application management solutions. Quest provides customers with Application Confidence<sup>sm</sup> by delivering reliable software products to develop, deploy, manage and maintain enterprise applications without expensive downtime or business interruption. Targeting high availability, monitoring, database management and Microsoft infrastructure management, Quest products increase the performance and uptime of business-critical applications and enable IT professionals to achieve more with fewer resources. Headquartered in Irvine, Calif., Quest Software has offices around the globe and more than 18,000 global customers, including 75% of the Fortune 500.



[www.quest.com](http://www.quest.com)

[info@quest.com](mailto:info@quest.com)

Inside U.S.: 1.800.306.9329

Outside U.S.: 1.949.754.8000

Please refer to our Web site for regional and international office information.

All content Copyright © 2002 Quest Software, Inc. Benchmark Factory, FastLane, Spotlight, Foglight, LiveReorg and SharePlex are registered trademarks of Quest Software. All other brand or product names are trademarks or registered trademarks of their respective owners. The information in this publication is furnished for information use only, does not constitute a commitment from Quest Software Inc. of any features or functions discussed and is subject to change without notice. Quest Software, Inc. assumes no responsibility or liability for any errors or inaccuracies that may appear in this publication.