



Application Consolidation

As enterprises look for ways to reduce costs and simplify IT management, they often consider various approaches to server consolidation. Among them, application consolidation offers significant benefits, particularly when the applications are consolidated onto an open platform, such as one running the Linux® operating system.

This Mixed workload consolidation refers to running multiple, heterogeneous applications simultaneously on a single instance of the operating system. This can provide numerous benefits, including increased server utilization and simplified management of your information technology (IT) infrastructure.

It is clear that many IT organizations can potentially achieve extensive cost savings and improved application reliability by consolidating their applications onto a common hardware infrastructure. However, there are many complex issues to consider, and achieving the right balance between application isolation and resource utilization is a critical success factor.

About the Author

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Introduction

Given the current global economic downturn, it is no surprise that large organizations are putting cost cutting measures at the top of their priority lists.

This trend is particularly true in the information technology (IT) arena, as the overspending of the last few years and the associated poor ROI has resulted in intense scrutiny on IT spending. One of the initial responses to this new focus on cost cutting from many IT organizations has been to consolidate much of their server infrastructure. By controlling and reversing the “server sprawl” trends of the last few years, organizations have recorded substantial savings in server administration and management. Now organizations are looking at even greater savings by consolidating their server infrastructure as well as the associated applications running on those servers – definitely a more complex, yet potentially more rewarding undertaking. In addition to the potential cost savings, organizations that are able to consolidate their applications will be positioning themselves for the greater benefits of a truly adaptive enterprise.

As enterprises look for ways to reduce costs and simplify IT management, they often consider various approaches to server consolidation. Among these, application consolidation offers significant benefits, particularly when the applications are consolidated onto an open platform, such as one running the Linux® operating system.

This Mixed workload consolidation refers to running multiple, heterogeneous applications simultaneously on a single instance of the operating system. This can provide numerous benefits, including increased server utilization and simplified management of information technology (IT) infrastructures.

In the past, servers were deployed with single workloads — generally, a single application running on each server. However, recent innovations in server hardware and innovations in application software support the deployment of servers with mixed workloads. This means that you can run multiple heterogeneous applications on a single server.

The major benefits that can be realized with mixed workload consolidation include the following:

- Reduced server operating costs
- Improved service levels
- Reduced space requirements for equipment
- Improved security
- Better utilization of computing resources
- Increased standardization
- Improved reliability and availability
- Better control of your information technology (IT) resources

Before undertaking mixed workload consolidation, you must determine which applications to consolidate and how to consolidate them. This requires a logical and systematic approach. You must ensure the compatibility of all applications with each other and determine the most appropriate way to deploy consolidated applications.

Challenge

At first glance, application consolidation appears to be only incrementally more difficult than server consolidation.

However, while server consolidation generally consists of moving servers into a centralized administration and management infrastructure and eliminating redundancies, application consolidation involves running multiple, independent applications on the same hardware. Application consolidation immediately raises several issues:

- How can I guarantee service levels between applications?
- How can I prevent one errant application from affecting other applications?
- How can I reconcile differing needs for operating system patch levels between applications...and so on.

It is clear that any application-consolidation initiative has a high potential for failure unless these and sundry other issues are proactively addressed and accounted for.

The primary issue underlying application consolidation is striking the right balance between application isolation and resource utilization. In an ideal world, every application would be completely isolated from every other application running on the shared infrastructure, while simultaneously achieving optimal resource utilization. Of course, there is no ideal world and, to make matters worse, the goals of application isolation and maximum resource utilization tend to be inversely proportional to one another. That is, the more application isolation you achieve, the less resource utilization you record and vice versa.

Managing multiple distributed applications can be costly and difficult. To lower management costs and improve application performance, IT personnel are consolidating their databases, Web application servers, and mission-critical applications onto platforms running the Linux® operating system. The cost-effectiveness, stability, and scalability of Linux have made it the fastest growing operating system in the IT industry today. In addition to a stable operating system, application consolidation requires reliable hardware and management software to ensure the availability and performance of the applications.

Some aspects of Linux-based application consolidation:

Coordination of application software deployment: Businesses must be able to plan seamless software installations, upgrades, and maintenance on hundreds or even thousands of Linux-based servers.

Service management: Once applications are ported to Linux, IT personnel must be able to measure return on investment (ROI) and end-to-end response times.

Methodology

Key Stages of Consolidation

| Different Types of Consolidation and Potential Benefits | | | |
|---|--|--|--|
| Logical Consolidation | Physical Consolidation | Workload Consolidation | Application Consolidation |
| Simplified Operations - Common Processes and standard systems management procedures | Co-location of multiple platforms at fewer locations | More users on fewer platforms for the same application | Combine mixed workloads on fewer platforms |
| Fewer consoles | Fewer data centres | Fewer servers | Fewer servers |

In Application Consolidation, the focus is on

- Identifying applications that are duplicated, can be outsourced or rendered obsolete
- Reducing the number of application instances and databases
- Migrating multiple instances of the applications from disparate platforms
- Standardising on single application and database solutions
- Tuning the application's performance to meet your unique requirements

The steps involved are:

Application Consolidation assessment

In this step business applications and databases are assessed, taking business drivers, impact of change, TCO, and ROI into consideration.

Analysis

In this step Tools are developed to achieve Application Isolation and Application Consolidation.

Designing

In this step, the Design of the Backup methodology, Management and Middleware are looked into.

Implementation

In the Implementation phase a Pilot Project is executed with the above considerations.

Pilot Application Consolidation - By piloting a subset of applications, rather than the entire environment, you are assured that your business will benefit from the consolidation.

Phases for Application Consolidation:

Every Application Consolidation project follows set phases to help ensure a successful delivery, according to the requirements defined in your detailed consolidation proposal. Tailored to your unique needs, these include:

- Phase 1 - planned and detailed assessment
- Phase 2 - tools development and customisation
- Phase 3 - test migration
- Phase 4 - application migration
- Phase 5 - acceptance
- Phase 6 - installation, warranty, and product support

Application Consolidation Best Practices

1. Choose mainstream operating systems and databases. Consolidate around open source operating systems and databases that will run as large a percentage of your application set as possible.
2. Use portable APIs and generic SQL ANSI C with POSIX, Java, Web scripting languages, Perl and .Net Framework languages. All of them provide portability insurance. Make a policy of preferring generic SQL to vendor-specific syntax where the two are functionally equivalent, and use the data abstraction APIs in your programming language of choice as much as possible.
3. Modular applications, Web applications and other three-tier designs cost less and are easier to consolidate than monolithic designs because parts of the application can be consolidated without affecting other application tiers.
4. Use single sign-on and distributed directories Avoid built-in application directories and use single sign-on or (as a less attractive option) directory synchronization tools to make application consolidation easier without disrupting existing user names or passwords.
5. Design for high availability. If you put all your eggs in one basket, you have to watch that basket very carefully. Running multiple mission-critical applications on a single server or server partition means that uptime is much more critical. Well-thought-out fail over systems and disaster recovery plans are an absolute must.

6. Pursue vertical (scale up) and horizontal (scale out) scalability. Horizontal scaling (through the use of multi-machine clustering) is much cheaper in terms of initial investment and provides the best price/performance ratio for consolidation, but it is also much more restrictive in the types of applications supported.
7. Delegate administrative domains. This is one of the biggest technical challenges in application consolidation and a major reason for server sprawl in the first place. Many packaged applications do not support administrative domains or delegation. Server partition or system virtualisation techniques may be the only viable approach to properly partition some applications.

Server and Application Consolidation – A Case on IBM zSeries

Linux for zSeries consolidation

Linux for IBM® zSeries® is an excellent platform for server consolidation. There are many applications available today that you can use to quickly begin a server consolidation project. These include:

Web-serving, File/print, Mail/messaging, Enterprise application consolidation, Data management, Application development, zSeries offering for Linux, Hosting and e-business solutions.

WebSphere Application Server for zSeries

The WebSphere® Application Server on the zSeries provides a quick way to help reduce operations cost as well as architectural complexity. The combination of the IBM WebSphere Application Server and zSeries (available on z/OS® and Linux) is intended to allow you to consolidate multiple logical Web servers on multiple physical hardware onto a single zSeries machine, which may help you save money on operations and hardware costs and help reduce the overall complexity of your configurations.

You can consolidate your applications on the WebSphere Application Server running under z/OS or on Linux for zSeries. Consolidating Web servers on z/OS allows you to take advantage of the integration that WebSphere Application Server for z/OS has with the z/OS operating system, while leveraging the robust qualities of service inherent to the zSeries hardware. And consolidating Web servers on Linux for zSeries can help deliver an easy migration and a quick time to value, while also leveraging the zSeries hardware.

Summary

It is clear that many IT organizations can potentially achieve extensive cost savings and improved application reliability by consolidating their applications onto a common hardware infrastructure. However, there are many complex issues to consider, and effecting the right balance between application isolation and resource utilization is a critical in ensuring that the effort is successful.

For most large enterprises, there is probably no single application isolation strategy that will work in every situation. Simply put, different applications have varying isolation needs and any all-encompassing strategy must be flexible enough to accommodate the majority of those needs.



About Open Source & Linux Practice

From understanding business pain areas, recommending and implementing solutions to providing support, the OSL practice at TCS helps enterprises to overcome the challenges moving to Open Source, achieve tangible results and optimize the Total Cost of Ownership (TCO). The OSL practice offers secure and scalable solutions, built around Linux & Open Source, that cover Application Development, Re-engineering, Migration, Product Porting, Application Consolidation and Kernel Programming.

About Tata Consultancy Services

Tata Consultancy Services (TCS) is among the leading global information technology consulting, services and business process outsourcing organizations. Pioneer of the flexible global delivery model for IT services that enables organizations to operate more efficiently and produce more value, TCS focuses on delivering technology led business solutions to its international customers across varied industries.

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