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White Paper

Using Linux on z/VM to Meet the Challenges of the 21st Century

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Introduction

The need for cost-effective, reliable solutions to IT problems has become more acute through the first decade of the 21st century. IBM has expanded its growing commitment to Linux on System z to meet that need. The z/VM Version 6 Release 2 (z/VM 6.2) virtualization platform addresses the complexity and inefficiency in today's multi-architecture data centers.

IBM invented and engineered virtualization in the late 1960s to optimize expensive data center resource utilization. IBM has continued to deliver innovative System z (mainframe) virtualization solutions for decades. In 2000 IBM included the 64-bit architecture into z/VM, while retaining backward compatibility for 31/32-bit architectures.

Now z/VM 6.2 introduces a technology vision that contributes significantly to profitability and positions the organization for future growth, while retaining current technology usability. In addition, this can be done with an IT budget at half the national average (as a percentage of revenue).

> …Linux is a fundamental component of IBM business—embedded deeply in hardware, software, services and internal development. It is present in every IBM business, geography and workload, and its use only continues to increase….
>
> **Daniel Frye**
> *Vice President, Open Systems and Solutions Development, IBM*

z/VM 6.2 focuses on affordable Linux virtualization and improved consolidation. The object is to address a growing data center crisis, caused by a sprawl of under-utilized x86 and RISC systems, ever-escalating costs, and budget stagnation.

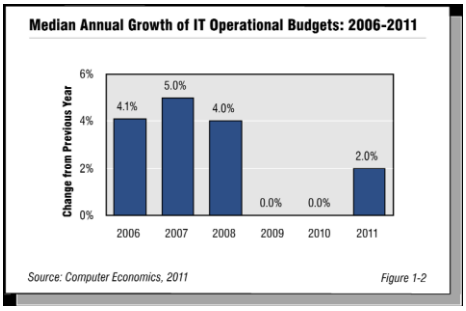
The challenges that have impacted businesses across a broad range of industries and many regions of the country have highlighted the need for scalability, reliability, and security.

Using virtualization to centralize and consolidate IT workloads, organizations can now significantly reduce their IT costs as a percentage of revenue, reduce operational expenses, improve availability, and achieve better performance and utilization.

Problem Statement

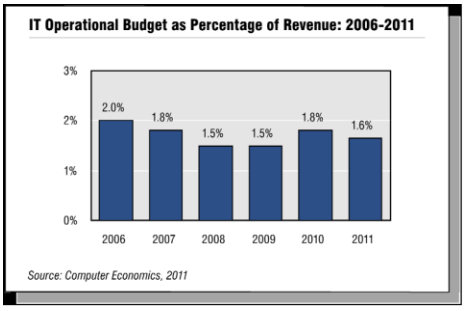
The challenge that confronts IT professionals in today's environment is to maintain current service levels using existing equipment without increasing budget demands.

The chart indicates that IT budgets, on average, have been reduced significantly since 2008. In addition, many businesses are managing the integration of existing systems with those of merged and acquired partners, and trying to position themselves for future challenges.



However, there was a slight increase in median IT operational budgets to 1.8 percent last year; these budgets have fallen since 2006. This indicates that organizations are restraining IT spending.

These cost factors are driving many enterprise computing decisions towards IT consolidation and centralization. As a result, decision makers are taking a hard look at the total cost of ownership (TCO) and the total value of ownership for enterprise computing.



IT hardware costs, as measured by $/performance, have come down significantly with the adoption of new x86-based hardware technologies. The associated software and operational costs, on the other hand, continue to rise, and these costs dominate the TCO. An alternative solution is required – one that focuses on IT cost reduction and maintains current service levels.

Solution

Successfully meeting these 21st century challenges contributes significantly to profitability and positions the organization for future growth. Adding to operational efficiency are improved hardware performance; server and desktop virtualization; declining storage costs; cloud computing; outsourcing and offshoring; data center

automation, and other factors. No doubt, the recent recession was a factor in declining spending per user, but it merely accelerated the long-term trend.

To meet those challenges IBM developed the z/VM 6.2 virtualization technology, providing the following features and benefits:

- Multi-system virtualization allows up to four z/VM instances running on other logical partitions (LPARs) or other System z servers to be clustered as a single system image (SSI). The SSI function minimizes the complex system programmer steps required for clustering technology, by enhancing systems management and enabling to share and coordinate resources within a SSI structure.
- z/VM 6.2 provides increased horizontal scalability and improved manageability. This helps avoid the virtual machine-sprawl of x86/RISC-based systems –hosting thousands of server images on fewer real systems – and enhances workload balancing. z/VM scales up to four systems horizontally, each with up to 32 CPUs and 256GB memory.
- By providing shared resources for the z/VM instances and their hosted virtual servers, it creates tremendous business value, facilitating solutions in virtualization, consolidation, transaction processing, business intelligence and analytics, business process management and risk management.
- z/VM 6.2 Live Guest Relocation (LGR) takes guest mobility to the next level. LGR moves virtual servers non-disruptively to another LPAR on the same or another System z server in the single system image. This helps clients avoid planned outages for virtual servers when performing hardware or software maintenance.
- z/VM allows organizations to move workloads to available system resources non-disruptively, in addition to its long-standing capability to move system resources to workloads without disruptions.
- z/VM 6.2 takes advantage of the zEnterprise hardware capabilities, simplifies systems management of a multi-z/VM environment, and therefore improves the effectiveness of the Linux environment.
- z/VM technology allows enterprise Linux applications to run alongside, for example, a DB2 database running on z/OS on a different partition on the same zEnterprise system.
- IBM HiperSockets technology provides network services between applications across partitions. It also has the ability to allocate bandwidth dynamically where it is most needed, ensuring very fast operations.

System z has always enabled moving resources to the workload that needed it. With z/VM 6.2, Single System Image and the Live Guest Relocation capabilities add more

value by allowing workloads to move to the resources in a non-disruptive manner. Exploiting SSI and LGR does not mean giving up the rich resource control and management features customers have come to love with z/VM.

z/VM Success Stories

The best way to illustrate z/VM 6.2's features is to view actual installations in which it is a major contributor to the organizations' success. The organizations have received benefits that include:

- Ease of maintenance: no longer having to maintain multiple z/VM environments. A single point of maintenance means half as much work.
- No downtime – they can now migrate Linux images between multiple so that all maintenance and planned outages will have no effect on their application servers.

The following examples from widely divergent industries illustrate z/VM 6.2 advantages:

An American Manufacturer - Baldor Electric

It is remarkable that a company would register growth of any size during the recent economic challenges, let alone double-digit growth. That is what Baldor Electric, a mid-sized industrial product manufacturing firm, has accomplished. From home offices in Fort Smith, Arkansas, Baldor operates 23 manufacturing facilities in the US and three in Mexico, China, and England. These facilities produce high-quality industrial electric motors, mechanical power transmission products, drives and generators. They have averaged 15 percent growth over the last 20 years. Mark Shackelford, vice president of information services, states that IT costs have now been reduced to less than one percent, as a percentage of revenue.

Baldor needed to find a way to compete internationally from home. Exploiting the order processing efficiency and delivery advantage offered by its US location, very fast delivery timescales could be turned into an unbeatable proposition.

The Baldor Customer/Supplier Connect solution, based on SAP software, enables both suppliers and customers to gain a direct view of product order status. This process brings delivery service levels that offshore competitors find impossible to match, and Baldor's US location has become a key competitive advantage.

Shackelford, states; “Our added-value approach to taking care of our customers has propelled us to the market-leading position for industrial electric motors and mechanical power transmission products in North America, confirming that customers always look for the best value available.”

Baldor, like any successful company, continues to evaluate and update its technology vision when it sees a value-added solution. Such is the case with the release of z/VM 6.2. The next phase of Baldor’s technology vision includes two z/VM production systems, one on the z10 and one on the z196.

Shackelford believes, “this implementation will provide many usability enhancements that increase our productivity and let us focus on customer projects, versus focusing on internal projects, with continued improvement in high availability. LGR is the very best z/VM software enhancement since 64-bit support was available.”

The Banking Industry – Major US Financial Firm

Consider the operations of a major US banking and financial services company, one of the largest companies in the US, with operations around the world. The company is one of the largest banks in deposits, one of the largest banks by assets and one of the largest banks by market capitalization, home mortgage servicing, and debit cards in the US.

The company has grown to 6,335 retail branches 12,000 automated teller machines, 280,000 employees and over 70 million customers.

The national network operates from two data centers that support a wide variety of applications, including POS and ATM operations. The data center consists of nine systems running z/VM, with six for disaster recovery. The data center’s operating systems engineer states that the ability to provide uninterrupted reliable service is critical. The bank's IT executive says, “z/VM allows ATM operations without interruption, which is critical to our maintaining customer satisfaction.”

The growth and merger challenges of an organization this size were met by z/VM. The bank has been on z/VM since 2001. With the completion of a merger, they will now migrate the systems to z/VM 6.2. The bank's IT executive believes that implementing z/VM 6.2 will provide a solid basis for meeting future growth challenges, she states, “we find that the advantages of z/VM 6.2 features will provide a solid basis for the future.”

Conclusions

The introduction of z/VM 6.2 provides the opportunity for IBM to make good on its promised support for continuing improvements in an already superior system – Linux on z/VM on System z.

Success in business is never the result of any one event or decision. It is the combination of making the right decisions at the right time, with the right people. The examples are companies that are using the z/VM 6.2 virtualization technology solution to position themselves for growth in the worst economic climate in decades.

The future, they feel, will see continued improvements in utilizing hardware resources to maximize customer service. That service translates into continued success, as z/VM continues to provide excellent customer value.

For Baldor – the combination of SAP and IBM z/VM 6.2 solution has made its US location a competitive advantage. Baldor is a high value, high customer service business, winning in the global economy.

IBM z/VM 6.2 has also been a key contributor to the ongoing success of a US bank by enabling it to smoothly merge its existing operations, maintain support for constantly changing customer requirements, and maintain data security.