IBM @server i5 Virtualization Grand Slam Benchmark: Executive Summary

A real-world business scenario demonstrating the power of virtualization for server and application consolidation

As the cost of systems management continues to escalate, server and application consolidation is becoming an attractive alternative for many businesses. However, comparing the performance of a consolidated system to the performance of multiple networked systems can be difficult. Now IBM has developed the Virtualization Grand Slam benchmark to help mirror the real-world requirements and demands that face companies attempting to streamline their IT infrastructures through server and application consolidation. Conducted on the POWER5 processor-based IBM @server i5 570 server – one of the newest members of the IBM @server iSeries family – this benchmark was designed to showcase the @server i5 system and its ability to effectively manage multiple applications and operating systems under everyday stresses without compromising performance, usability or value.

The results of this benchmark demonstrate that companies can better use the full performance and capacity of their IT infrastructures by running multiple applications on a single @server i5 system – thereby increasing return on investment (ROI). In addition, @server i5 servers can allow businesses to:

- *Run applications designed for IBM i5/OS, IBM AIX 5L, Linux® and Microsoft® Windows® operating systems simultaneously on a single server without compromising performance or manageability*
- *Automatically balance central processing unit (CPU) resources across micro-partitions to minimise the effect of sudden increases in application workload*
- *Manage multiple application workloads through a single intuitive praphical user interface (GUI).*

Behind all of these remarkable capabilities is the flexible, dependable iSeries integrated architecture. This architecture features subsystem management capabilities that automatically allocate resources to applications as needed, helping to ensure the highly efficient utilisation of system resources. Servers that cannot efficiently manage multiple applications and operating systems in this manner often use only a small percentage of their total available capacity. As application needs grow, businesses that employ such under-utilised servers are forced to add new servers – as well as cost and complexity.

Previous iSeries models allowed micro-partitions (dynamic logical partitions) to run multiple environments of the IBM OS/400 and 64-bit Linux (Linux on POWER) operating systems to help consolidate systems and applications. Integrated xSeries Adapters (IXA) and Integrated xSeries Servers (IXS) also supported multiple Windows-based applications. In addition to these capabilities, @server i5 servers now enable companies to run AIX 5L and 32-bit Linux (Linux on Intel®) operating systems (via the IXA or IXS) on the same server as well. The @server i5 server is the only server in the market today that is designed to run these five popular, distinct operating systems.

The business scenario

To demonstrate the versatility of the unique virtualization capabilities available on @server i5 systems, IBM devised a new benchmark using popular commercial application workloads such as PeopleSoft Enterprise One, PeopleSoft Enterprise Learning Management, Trade3, as well as Linux-based file serving (Samba) and firewall applications.

This new benchmark model – the Virtualization Grand Slam – demonstrates the outstanding results and excellent response times that companies can achieve using @server i5 systems to consolidate servers and applications. What can these results mean for your business?

- **The Gold Standard for server consolidation.** *The Virtualization Grand Slam benchmark results show that the @server i5 system pushes the number of users per CPU to higher levels by taking advantage of POWER5 simultaneous multi-threading features. With this enhanced processing capability, administrators can consolidate applications and workloads onto fewer servers, often resulting in reduced cost and simplified administration.*
- **Easy, on demand scalability.** *By using dynamic processor sharing across partitions, this benchmark demonstrates the ability of @server i5 systems to handle sudden increases in a partition's application workload by harnessing under-utilised, available resources in another partition without operator intervention.*
- **Enhanced manageability.** *Using new IBM Virtualization Engine capabilities, companies can transparently manage five different operating systems (three of these five were used in the benchmark) through a common monitoring interface, which can help streamline operations. Alerts also can be set on various thresholds to signal system administrators or users when problems occur.*
- **Reduced total cost of ownership (TCO).** *A single @server i5 system can support virtually all application needs, both old and new, without the management hassle of a server farm. This can result in less complexity and reduced TCO.*
- **Dependable server and application availability.** *The @server i5 system is designed with virus resistance and security in mind. This design can help reduce outages due to virus attacks and improve application availability to end users.*
- **Better customer service and increased revenue.** *@server i5 performance and subsecond response times can promote greater employee productivity, higher volumes of business transactions and improved customer service through reduced wait times.*

Setting the stage with multiple application environments

The benchmark used four application environments, each representing a different business application that a midsize company would typically run: enterprise resource planning (ERP) software, represented by PeopleSoft Enterprise One version 8.9; e-learning software, represented by PeopleSoft Enterprise Learning Management 8.81; stock-trading software, represented by Internet-based Trade3; and file serving, represented by Samba. These applications require different environments to run and can often be found on multiple servers in Intel implementations. On an @server i5 system, these four environments ran on three different operating systems – i5/OS, AIX 5L and Linux – further demonstrating the consolidation capabilities of the @server i5 system.

Systems management across multiple systems presents significant challenges for businesses, and the task can become even more complex when the systems run various operating environments. For these reasons, Virtualization Engine Console software that allows the monitoring of heterogeneous environments through a common user interface – was used in the benchmark to monitor the four micro-partitions under test and to generate performance-based alerts when exceptions occurred.

The benchmark involved four scenarios:

1. Each application was run individually in its own 2-way, fixed logical partition to establish a baseline.
2. All application workloads were run concurrently, each in a 2-way, fixed logical partition. These results were compared to the baselines obtained in the first scenario.
3. New baselines for the applications were captured using shared-processor micro-partitions with all application workloads running concurrently.
4. While all application workloads were running concurrently using shared processors, one of the workloads was significantly increased to demonstrate resource sharing, and the results were then compared to those of steps 2 and 3.

An extraordinary benchmark for an extraordinary server

In the age of On Demand Business, no business should have to compromise peak performance or manageability to run multiple, secure applications on a single server – nor should they trade the performance of one application for the ability to accommodate the fluctuating demands of another.

By using the four scenarios of the Virtualization Grand Slam benchmark, companies considering server or application consolidation can quantitatively compare the advantages of the @server i5 system as a consolidation platform to the attributes of competing systems. The scalability and virtualization capabilities of IBM POWER5 architecture make @server i5 systems particularly well suited to handle consolidation initiatives.

In addition, the benchmark demonstrates a real-world scenario in which clients can benefit from the virtualization of hardware and software applications across multiple Micro-Partitions, thus enabling a single server to operate as though it were multiple servers. Several operating systems, including i5/OS, AIX 5L, Linux on POWER, Linux on Intel and Windows, can run concurrently on a single @server i5 570 without requiring companies to compromise performance or manageability. By using Micro-Partitioning, companies can balance CPU resources across partitions to minimise the effect of sudden increases in application workload. IBM Virtualization Engine Console software also enhances manageability and helps lower TCO by creating a common interface to monitor heterogeneous operating systems and application environments.

The Virtualization Grand Slam benchmark clearly demonstrates that @server i5 systems can be an excellent solution for today's businesses, helping them run the applications and operating systems they need without compromising performance, scalability or manageability. Complete with integrated Web enablement tools, database, storage and self-managing capabilities, @server i5 systems – the newest members of the iSeries family – can truly help your company transform into an On Demand Business.

For more detailed information, benchmark results or the detailed Virtualization Grand Slam benchmark whitepaper, please visit **ibm.com**/eserver/iseries/hardware/virtualizationgrandslam.

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