how can I optimize performance of my z/VM and Linux on System z environments?
Measure, monitor and control the performance of your z/VM, Linux on System z and TCP/IP environments with Velocity zVPS Performance Suite.
executive summary

Challenge

Consolidating workloads to Linux on System z helps reduce IT complexity and lower overall costs. As you leverage the benefits of Linux on System z, you face continued pressure to confirm that operations run smoothly, service levels are met, costs are managed and future capacity needs are planned for. As these workloads grow, the need to monitor and manage performance becomes increasingly critical. You need to know where the load is, what the load is, and be able to address any problems immediately.

Opportunity

Velocity zVPS Performance Suite (zVPS) provides an integrated set of performance management and capacity planning solutions designed to help you measure, monitor and control the performance of z/VM, Linux on System z and TCP/IP networks. It continually collects data from these environments in a consistent format and provides a real-time graphical display of the performance data for easy analysis and tuning. zVPS provides automatic analysis triggers that alert when performance exceptions occur. You can generate reports for long-term trend analysis and capacity planning when migrating workloads to Linux on System z, as well as view comparisons before and after consolidation to Linux on System z.

Benefits

zVPS provides accurate and detailed information for performance analysis and chargeback accounting because it gathers data not only from z/VM but also from each Linux on System z guest, as well as from networks and distributed servers, for a comprehensive cross-platform view of operations across the enterprise. This detailed data collection also enables benchmark analysis and capacity planning when preparing for server consolidation to help you determine the most cost-effective platform for a given workload. Expertise has been embedded into zVPS to provide intelligence and guidance on making effective performance decisions. zVPS works with CA Technologies solutions to help you know that the Linux on System z workloads are operating efficiently and meeting performance service level agreements.

zVPS uses minimal overhead to run, which limits overall IT costs. All zVPS monitoring capabilities and user interfaces can run continuously to help provide high levels of proactive problem prevention and performance trend analysis.
Section 1: Challenge

Managing the performance of Linux on System z under z/VM

Today’s IT systems typically include multiple operating environments, complex networks and numerous applications. Most Linux on System z customers take advantage of the z/VM virtual environment since running Linux under z/VM on the mainframe makes it much easier and faster to create multiple Linux images and manage them effectively. The z/VM environment also supports multiple applications, users and virtual servers competing for common system resources. As organizations try to measure and manage the performance of all components within a growing, and sometimes complex, infrastructure, they often face the following challenges:

- **Meeting current service levels**: Requires the ability to gather current performance measurements, as well as the ability to analyze performance from previous timeframes.

- **Planning for future capacity needs**: Capacity planning requires full reporting of all data, a long-term performance database, and data extraction capabilities to track utilization of all resources.

- **Providing operational efficiency**: When organizations are running hundreds or thousands of Linux guests on their z/VM environment, they need to quickly detect operational issues such as looping processes, exceeding disk capacity, excessive paging, etc.

- **Managing costs**: As Linux workloads are added to the mainframe, organizations need to gather complete and accurate data so that resource consumption can be measured and charged back to the appropriate consumer.

- **Gathering data**: Organizations are often challenged with gathering performance data for Linux running under z/VM due to some common shortfalls with current tools and processes:
  - Overhead of collecting data
  - Accuracy of the data
  - Inability to obtain complete data
Section 2: Opportunity

**Velocity zVPS Performance Suite**

zVPS is designed to measure, monitor and control the performance of today’s complex IT systems. As an integrated solution, zVPS provides the following capabilities:

- **Performance management:** zVPS provides real-time metrics on all facets of performance for each of your servers—including z/VM, Linux on System z and distributed servers—to enable immediate analysis of real-time problems.

- **Capacity planning:** zVPS offers a comprehensive performance database (PDB) that includes data from z/VM and all the servers it is monitoring. It also provides interfaces to popular enterprise capacity planning facilities such as CA MICS® Resource Management (CA MICS) and MXG.

- **Chargeback and accounting:** zVPS delivers comprehensive data for chargeback and accounting for both Linux on System z applications and z/VM virtual machines.

- **Operational alerts:** zVPS helps you confirm that performance and capacity issues are immediately detected and reported. It provides alerts via a 3270 interface and web-based browser, as well as via SNMP alerts that integrate into your management console.

- **Comprehensive data collection:** zVPS collects performance data on the following:
  - z/VM subsystems (processor, storage, I/O, paging)
  - z/VM guest resources
  - Linux on System z—disks, storage, processor
  - Networked servers (Linux, Unix, Windows)
  - Linux applications

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**Figure 1:** Components included in Velocity zVPS Performance Suite

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Velocity zMON

Real-time graphical display of up-to-the-minute performance information

If you have a system performance problem, it’s critical that you have all relevant and current information quickly available to you. Velocity zMON (zMON) is an on-line display facility that provides up-to-the-minute information on the performance of your z/VM or Linux servers running on IBM System z. It records and analyzes performance data, then generates real-time displays of this information.

zMON can display resource contention, consumption levels, transaction response times, user service levels and much more—for groups of users or for individuals. It can analyze CPU, storage and I/O performance in depth, and lets you define classes of virtual machines for detailed study of applications, user communities and services. zMON helps you understand system events as they unfold so you can pinpoint problems and quickly correct them. Key features include:

- **Comprehensive display facility**: Provides over 100 screens, from high-level overviews to detailed subsystem displays— including statistical summaries, full DASD cache analysis, SFS analysis, device analysis and Minidisk Cache.
- **Tailored displays**: Tailored screens meet individual or installation requirements—including the ability to set alert conditions and highlight them in your choice of color and preferred video characteristics.
- **Automatic updates**: Screens are automatically updated to provide current performance information.
- **Real-time tuning**: Program your own responses to performance criteria with a powerful real-time programming interface to your performance data.
- **Service level agreements**: Measure actual user response time against management objectives and view a real-time analysis of your systems performance compared to your service level agreements.
- **Easy to use**: zMON displays have the same look and feel as zmap reports, presenting your real-time data in a very intuitive format. Screens are automatically updated with up-to-the-minute performance information.
- **Low cost of operation**: zMON provides significant resource savings when monitoring users and transactions, even with seeks enabled. It dynamically reduces raw monitor data to history files, helping you reduce DASD requirements. This allows weeks or months of performance data to be available online, while providing up-to-the-minute information to guide you through problem determination.
- **Standard interface**: Based on the CP monitor facility, installation requires no “hooks” into the operating system. Furthermore, no upgrades are required when you install a new version of z/VM. zMON and zMAP support all existing releases of z/VM and VM/ESA, enabling you to maintain a single monitor for use with multiple systems or images running diverse z/VM versions.
- **Application analysis**: Many applications have been instrumented and may be analyzed using zMON, including applications such as FOCUS from IBI, EnterpriseWeb from Beyond Software, Trivial FTP from IBM, TCPIP, POP Server from VM Resources, and more.
Velocity zMAP

**Historical performance reporting provides in-depth post-analysis and capacity planning**

Velocity zMAP (zMAP) is a comprehensive performance reporting facility based on IBM’s CP monitor. To simplify tuning and capacity planning, several hundred reports are available by function within a performance hierarchy.

- **Data report and display consistency:** Whether you are looking at historical reports in zMAP or real-time displays in zMON, the formats are the same. The report options include comprehensive system reporting with statistical summaries, disk seek analysis, full DASD cache analysis, device analysis and service level agreement (SLA) reporting.

- **Subsystem analysis:** Analyze all subsystems including Processor, Storage, Paging, Minidisk Cache, DASD, Cached DASD, SFS, TCP/IP, FICON, ESCON, PAV, and various vendor applications. zMAP also provides interfaces to CA MICS, MXG, and SAS.

- **Avoid potential bottlenecks:** zMAP includes embedded artificial intelligence. Each time you run this reporter, potential performance bottlenecks are flagged and tuning recommendations are provided.

- **Performance database:** Extract and plot values and create your own reports with PDB functions.

Velocity zTCP

**Network performance monitor for distributed servers, Linux networks and z/VM**

Today’s networks are increasingly based upon TCP/IP. Critical to business success, these network assets must provide high levels of accessibility and availability for the strategic applications they support. Velocity zTCP (zTCP) enables you to monitor and measure the performance of both z/VM and your Linux network resources.

- **Monitor network service levels:** zTCP monitors performance, availability and service levels of your TCP/IP networks. It allows you to measure the traffic of every node in your network, including IBM’s System p, IBM Blade Servers including BX, Solaris, HP, Dell, Windows, Microsoft, and VMWare. You know immediately if a node stops responding, if there are implementation issues or if the network is experiencing bottlenecks.

- **Prevent network problems:** As your network grows and becomes more complex, you need to know where the load is, what the load is, and if there are network issues. By providing comprehensive performance data for your Linux servers, network and application data, zTCP enables you to have a comprehensive view of your current environment as well as the relevant metrics to help you anticipate future problems.

- **Standard network data:** zTCP uses SNMP (Simple Network Management Protocol) as a standard data source for network data. Servers, routers and mainframes provide load information to this standard data source on the transport layer, the Internet layer, and every interface on each node.
• **Monitor critical IP resources:** With zTCP you can monitor critical IP resources at the five levels of TCP/IP, including:
  - Application layer (telnet, FTP, NFS, SNMP for VM)
  - Transport layer (TCP and UDP)
  - Internet layer (IP, ICMP, and ARP)
  - Network layer (x.25, ethernet, token-ring)
  - Physical/hardware layer

**Velocity zPRO Portal**

**Web-based interface for z/VM and Linux on System z performance management**

As installations move towards System z in virtualizing their servers, there is an increasing need for a web-based interface suitable for system administrators. Velocity zPRO Portal provides a web-based interface for managing z/VM and Linux on System z. As a “native” z/VM based application, all functions use native z/VM facilities. This architecture provides several advantages, including ease of use and the ability to leverage additional z/VM facilities.

**Velocity zWRITE**

**Reduce monitor data while retaining information needed to performance proper analysis**

Velocity zWRITE is a data collection facility that dynamically reduces raw monitor data retained in history files, eliminating the need to write raw monitor data to disk or tape. It controls the collection, manipulation and reduction of raw monitor data. By continuously reducing raw monitor data in history files without sacrificing performance information, zWRITE reduces DASD usage, resulting in measurable cost savings and making the disk space available for other applications. Key features and benefits include:

• **Integration with zMAP:** History files are made available to zMAP to run reports as needed. ESAMAP’s run-time, CPU and main storage requirements are significantly reduced.

• **Reduce DASD requirements:** DASD requirements for performance data are reduced significantly by eliminating the need to store raw monitor data before processing by zMAP.

• **Customization:** zWRITE can be customized to automate history data collection and generation of zMAP reports. Parameters provide for user specification of intervals for history data, user class groupings, transaction classes and user service level analysis information. Control of zWRITE parameters is limited to authorized users.

• **Additional product interfaces:** Other extracts may be dynamically created in addition to the history files. For example, zWRITE can automatically create extract files for export to capacity planning tools such as CA MICS.
Velocity zVWS

High-speed web server for optimum z/VM performance and reduced CPU overhead

Industry analysts confirm that more than 70% of corporate information is stored on mainframes. In today’s cloud-connected world, it is increasingly necessary to distribute this information instantly on the Web for both external and internal corporate customers.

- **Performance:** Velocity zVWS (zWS) is a high-speed web server that supports high transaction hit rates while reducing CPU overhead. It is used worldwide by financial institutions, computer companies, non-profit organizations and others because of its performance, security capabilities and easy implementation. Features designed to drive optimum z/VM performance include:
  - Internal cache to eliminate I/O
  - Support of HTTP’s persistent connection to reduce TCP/IP output requirements
  - Support of IF-MODIFIED–SINCE: request header entry, enabling the browser to use its cached version if there have been no modifications to a requested file
  - Full performance instrumentation

- **Security:** Security is also an integral part of the web server design. zVWS supports the SSL (Secure Socket Layer) protocol to allow a browser user to authenticate the web server and communicate privately without tampering—while making audit trails of userid/access.

- **Web enablement OF z/VM applications:** “Shadow Migration Aid” enables you to run zVWS in emulation mode while migrating to a pure mode. Velocity zVWS also allows organizations to web-enable z/VM mainframe applications for direct Internet access to mainframe data, without the need for custom coding. Additional features of zVWS include:
  - Support of HTML, Image, EBCDIC, ASCII, CGI and SSI (server side includes)
  - Tilde Hack, file list, GET, POST, HEAD, SFS, minidisk
  - REXX and CMS Pipeline interface
  - Redirection/load balancing
  - Multi-home hosting
  - Logical device HTML support or 3270 emulation mode
  - CERN formatted log records
  - SMSG interface
  - Auto index support
  - ALIASing support
  - Extensive logging facilities
Section 3: Benefits

Maximize performance of your z/VM and Linux on System z environments

Expertise has been embedded into zVPS to deliver intelligence and guidance on performance decisions, and it provides many benefits in helping you manage your z/VM and Linux on System z environments.

More complete data collection
zVPS gathers data from each Linux on System z guest (in addition to z/VM), enabling more accurate and detailed information for performance analysis. In addition, zVPS gathers performance data for networks and distributed servers, providing a more complete cross-platform view of operations across the enterprise.

Efficient overhead monitoring
zVPS uses efficient agents to acquire performance data from Linux. The zVPS agent is netsnmp, open source and very efficient, using only about 0.1% overhead. Monitoring performance for hundreds of servers typically requires only about 10% of one IFL processor. Because of this low overhead, the zVPS monitor can run all the time. This monitoring helps you to fix a problem before it occurs, and also provides the data you need to perform trend analysis.

Prevent performance problems
zVPS can help you detect and resolve problems before users even notice. zVPS offers an automated facility that recognizes errors, excessive load conditions and other user-defined exceptions based on your specific criteria. zVPS then optionally performs corrective action. Additionally, zVPS displays a visual representation of potential bottlenecks and system problems.

Increase ROI of server consolidation
zVPS helps you optimize hardware and software efficiency by showing system-by-system and application-by-application storage, processor and I/O requirements, giving you information to help determine the most appropriate platform for each workload.

zVPS gets below the surface of the server levels to provide an understanding of how your Linux on System z resources are being used. Breakdown of usage at virtual server levels enables more detailed (and accurate) allocation of charges, as well as giving you the ability to better track and help grow utilization of your IFLs.

Consolidate to Linux on system Z with greater confidence
In addition to gathering z/VM and detailed Linux on System z performance data, zVPS also gathers performance data from distributed environments such as VMWare, Windows, Linux and UNIX servers. This enables you to execute benchmarks and analyze capacity requirements to help determine the most cost-effective platform for a given workload. CA Technologies solutions can help confirm that the Linux on System z workloads are secure, operating efficiently and meeting performance service level agreements. zVPS and CA Technologies solutions work together to help reduce the time, cost and risk of consolidating workloads to Linux on System z.
The CA Technologies advantage

Velocity zVPS extends the portfolio of solutions from CA Technologies that helps organizations manage, secure and optimize their mainframe z/VM virtual environment and the growing number of Linux on System z guests that are being hosted on that platform. Velocity zVPS provides real-time access to detailed performance data from both z/VM and Linux on System z. This data can be used by CA Technologies solutions to provide a comprehensive cross-platform view of operations management across the enterprise.

zVPS also complements CA VM:Manager™ Suite for Linux on System z, an integrated set of products that provide automated operations, service level management, security, backup and recovery and storage management for z/VM and Linux on System z environments. zVPS extends CA VM:Manager Suite by providing detailed data from each Linux on System z guest, as well as advanced graphical and web-based views of performance data for real-time performance tuning, trend analysis and capacity planning.

CA Technologies continues to have a strong commitment to developing, enhancing, and supporting its z/VM and Linux on System z solutions. CA Technologies is uniquely positioned to help you maximize the performance, reliability and efficiency of your overall IT environment with integrated solutions that help you control and manage multiple functions across multiple environments. In addition, CA Technologies delivers unparalleled and excellent technical and customer support worldwide. CA Technologies will continue to maintain its leadership role by developing and expanding its z/VM and Linux on System z offerings by leveraging new technology opportunities and responding to customer needs and requirements.

CA Technologies is an IT management software and solutions company with expertise across all IT environments—from mainframe and distributed, to virtual and cloud. CA Technologies manages and secures IT environments and enables customers to deliver more flexible IT services. CA Technologies innovative products and services provide the insight and control essential for IT organizations to power business agility. The majority of the Global Fortune 500 rely on CA Technologies to manage their evolving IT ecosystems. For additional information, visit CA Technologies at ca.com.