IBM Global Services
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IBM Managed Hosting - Linux virtual services

Taking a closer look.

Contents

Overview

Businesses today face new challenges when it comes to information technology (IT). Tight budgets and rapid change create a high-risk climate for technology investment. As a result, many companies are looking for new ways to acquire IT capabilities:

- *As a utility*
- *Offering instant access to what they need, when they need it*
- *With "pay-as-you-go" flexible pricing*

This has set the stage for a new delivery model that can empower you to do more with e-business: We call it e-business on demand™–The Next Utility™.

IBM Managed Hosting - Linux® virtual services is an e-business on demand solution that offers you cost-effective managed server capacity on an on-demand basis. This document provides a closer look at Linux virtual services and the components that are part of this offering.

What is Linux virtual services?

Quite simply, it is an IBM Managed Hosting solution in a virtual environment that leverages IBM expertise in mainframes, Linux and hosting. Linux virtual services allows you to replace your physical Web, database and application servers with virtual servers running Linux. Because this is an e-business on demand solution, you pay only for the processing, storage and network capacity you need, with the ability to easily add more to handle peaks or as your needs grow.

Each of your virtual servers will be just like the physical servers your business relies on now—except they'll be consolidated on very reliable IBM @server™ zSeries® mainframes. You'll be spared the headaches and cost of managing multiple distributed servers—and all the routers, switches and discrete components that each provide a potential point of failure.

Best of all, your virtual environment will be managed by IBM at one of our state-of-the-art, security-rich IBM e-business Hosting™ Centers. So your dependence on expert, in-house IT skills can be greatly reduced—as can your expense.

Highlights

Leverage The Next Utility
- *Avoid up-front capital expense—pay as you go, and only for the server capacity required*
- *Deploy new virtual servers—and applications—fast, and reduce time to market*

Tap into extra capacity when you need it
- *Simplify capacity planning—extra server, storage and network capacity is on tap if required*
- *Handle regular workload peaks, such as during backup or batch processing*
- *Have built-in safeguards to handle unanticipated workload surges*

Reduce IT expense by consolidating server workload
- *Dispense with that farm of constantly mushrooming separate servers*
- *Stop having to configure and maintain routers, switches, firewalls and load balancers, since server-to-server communication is handled internally*
- *Reduce your spending on proprietary operating systems, and migrate to the efficient, scalable Linux*

Rely on the availability of zSeries servers
- *Depend on the legendary reliability and power of the IBM zSeries to meet your most critical business requirements*

With Linux virtual services, companies can leverage the reliability of the IBM zSeries and the flexibility and power of Linux without a large up-front infrastructure investment.

Linux virtual services offers a compelling value proposition to enterprise and small-business customers alike. Whether you want to consolidate workloads from a sprawling distributed server farm, or tap into the power and flexibility of Linux without making a large-scale computing infrastructure investment, Linux virtual services can help you lower costs, increase reliability and simplify your IT infrastructure.

Linux virtual services solution architecture

IBM Managed Hosting - Linux virtual services leverages the reliability and power of the IBM zSeries mainframe to virtualize the hosting environment, reducing your floor space, power, labor and management costs. And by virtualizing and consolidating your servers, firewalls, routers, switches and load balancers, speed, reliability and efficiency are greatly increased.

Highlights

The rock-solid zSeries, IBM Virtual Machine technology, and stable, scalable Linux combine with IBM e-business Hosting expertise to create a unique e-business on demand solution.

Many consider the virtual environment offered by Linux virtual services to be superior to a physical hosted environment.

We split the computing capacity of an IBM zSeries mainframe running Linux into "service units"—essentially, units of processing capacity. You decide on the amount of storage, processing and network capacity you need (all on an on-demand basis), and the total is what makes up a virtual server, or Linux instance.

Each virtual server is completely isolated from others running on the zSeries. While a single zSeries can host multiple customer environments, you will have your own security-rich virtual environment of Linux instances, housed in a virtual cage. Your virtual servers are networked together by a common Linux instance acting as a virtual router.

By partitioning the processing, storage and network capacity for each customer environment, IBM isolates individual demand on the system, mapping resources to that demand while providing the same level of separation between customers as you would experience using physical servers.

Three proven components are essential to Linux virtual services: The rock-solid reliability of the zSeries server, the time-tested abilities of IBM Virtual Machine (VM) technology, and the stable scalability of Linux. These combine with IBM e-business Hosting™ expertise to create a unique e-business on demand solution that offers a virtual environment that many consider superior to a physical hosted environment.

IBM @server zSeries

The industrial-strength zSeries mainframe server gives you high performance, availability, connectivity and security features through advanced 64-bit z/Architecture™—one of the most extensive design efforts in four decades of large-scale computing. High availability is realized through very high component reliability, plus design features that assist in providing fault avoidance and tolerance, as well as permitting concurrent maintenance and repair. In short, the zSeries:

- *Provides substantial reliability and power*
- *Meets the mission-critical business requirements of many major corporations*
- *Delivers a high level of application availability*

Highlights

And with Linux virtual services, you can tap into these mainframe abilities in small, affordable increments, without the up-front expense of buying the physical hardware.

IBM Virtual Machines technology

Linux virtual services capitalizes on industry-leading zSeries Virtualization Technology from IBM. z/VM™ Version 4.2 is the newest VM operating system and features enhanced IBM Virtual Machine capabilities. Built on the solid VM/ESA® base, which IBM has been developing and perfecting for more than 35 years, z/VM exploits the new 64-bit z/Architecture, and acts as a host for the Linux servers that run as second-level virtual machines.

With IBM Virtual Machine technology, multiple Linux instances can be tied together through a virtual network including virtual connections and virtual routers.

z/VM also provides the ability to run multiple Linux instances tied together using a virtual network consisting of virtual connections and virtual routers. A pair of primary virtual routers connects this network to Gigabit Ethernet (Open Systems Adapter) cards that extend the network into the e-business Hosting Center. The tools and switches of the hosting center are used to connect to the Internet and monitor processes.

The Linux operating system

Linux is a revolutionary open-source platform that is cost-effective, stable, security-rich, scalable and powerful, offering today's businesses the flexibility to innovate for success. IBM is proud to work within the Linux community, to nurture Linux and help it thrive. Industry-standard, yet flexible and open, Linux brings with it access to a very large portfolio of applications and can reduce your dependence on proprietary operating systems. Today, Linux is the fastest-growing server operating system in the world, with more than 2,800 applications available. What's more, an ever-increasing number of Linux applications are being developed specifically for the zSeries. See the "Application support for Linux" section for more information.

Because of its low cost and reliability, millions of users are turning to Linux to run applications of all kinds.

Linux has become the most talked-about platform for e-business because of the virtually unrivaled value it offers compared to any other development platform in the technology industry. Millions of users worldwide have chosen Linux for applications that include Web and e-mail servers, departmental and enterprise vertical applications. The reasons that businesses are moving to Linux in ever-increasing numbers are simple: Cost and reliability.

Highlights

You can choose from a variety of service elements to round out your Linux virtual services solution.

Putting together your Linux virtual services solution

Linux virtual services is a comprehensive, flexible hosting solution, supported by IBM Managed Hosting expertise. The solution is made up of a number of service elements—some required, some optional. Details on each of these can be found in the following pages. You can combine service elements to meet your specific needs; a range of complementary services is also available.

Solution snapshot

Required per solution	Required per virtual server
• Linux virtual cage, which includes - Virtual router and firewall - Base DNS and mail services • Networking services	• Linux instance management[1] (optional for base Linux server and Linux Web server) • Dynamic storage services • Service units[2]
Available server types	**Additional options**
• Linux server (base) • Linux Web server (Apache) • DB2® for Linux • WebSphere® Application Server for Linux • WebSphere® Commerce Suite or Linux • Network-attached storage (NAS) for Linux	• High availability services • Linux assistance services
Complementary and tailored services	
• A range of complementary services—including storage and backup, monitoring and security services—is also available. Enhanced tailored services are designed to meet specific needs, and include virtual private network connections, advanced DNS and mail services, and advanced firewall.	

The virtual cage

The virtual cage is the cornerstone of IBM Managed Hosting - Linux virtual services. It is comparable to a physical cage, except that all the components are virtualized. As in a physical environment, one virtual cage is required per solution. Floor space and power, which typically add to the costs of a physical solution, are included in the virtual cage.

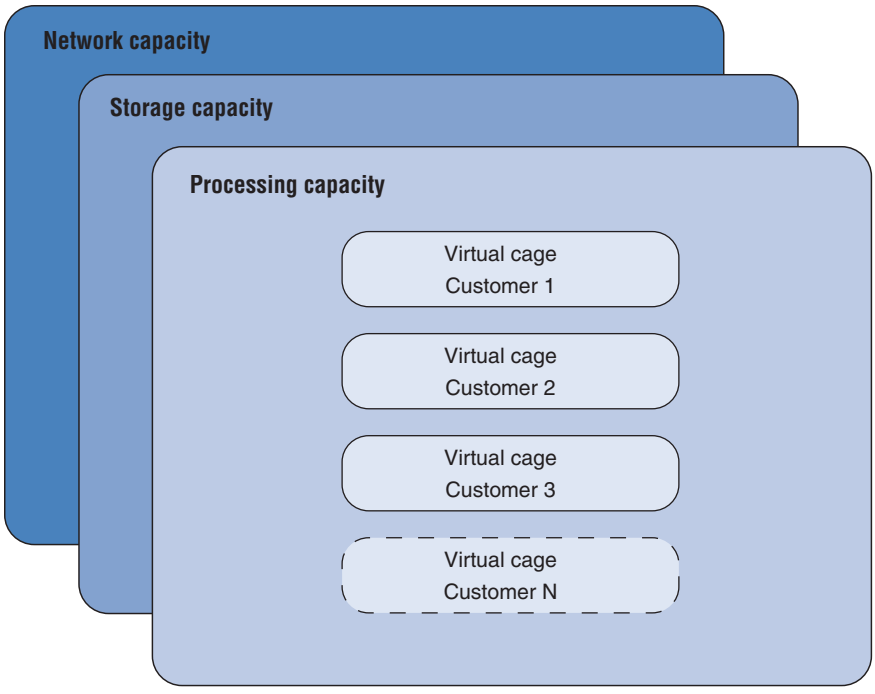
Highlights

The virtual cage provides you with a security-rich, standardized, scalable e-business platform to build on and is the base for the rest of the Linux virtual services elements. The following are incorporated into the virtual cage:

- *Virtual router and firewall*
- *Base DNS and mail services*
- *IP ping monitoring*
- *URL monitoring*

Routing, security and management are also built into this private virtual services environment, and the elimination of a number of discrete physical components allows higher throughput and greater reliability.

Because the number of discrete physical components is reduced through the use of a virtual cage, you benefit from higher throughput and greater reliability.



Highlights

Internet connectivity is not included as part of the virtual cage, and must be purchased separately to support your Linux virtual services solution. In addition, a minimum of 1,003MB of dynamic storage must be purchased to support the virtual cage.

Virtual router

Although customers share the zSeries server, each customer's data and traffic are protected by the use of virtual routers and firewalls. Your virtual router—actually a separate, specialized configuration of a Linux instance—is part of your virtual cage and acts as the gateway router to your cage. It also provides you with network connectivity between your Linux virtual servers. All server-to-server communication takes place internally. IP addresses for both public and private interfaces will be configured for each of your Linux instances and allocated to your virtual router; virtual routers are hardened and managed by IBM.

The virtual firewall provides the same level of protection as a dedicated firewall, without the investment in dedicated physical equipment.

Your virtual router connects to a primary virtual router outside your virtual cage, which acts as a network backbone and links to two Open Systems Adapter (OSA) cards to provide redundant connectivity to the IBM e-business Hosting Center.

Virtual firewall

The virtual firewall is a key component of Linux virtual services and is part of the virtual router. It is designed to isolate your environment not only from the Internet but also from other customers sharing the zSeries virtual servers.

In effect, the virtual firewall acts like a dedicated firewall and provides the same quality of service. You gain the same level of protection without the investment in dedicated physical equipment. Using proven Linux authentication and encryption techniques, the virtual firewall helps shield the hosting environment from denial of service (DOS) attacks, spoofing, and other internal and external intrusion attempts.

Highlights

The virtual firewall filters traffic according to a standard set of firewall rules. This firewall ruleset is designed to decrease the opportunities for intrusion. In general, the firewall rules limit the traffic that is permitted to enter your virtual cage. For example, one rule limits access to admin ports in order to prevent IBM customers from using functions like ping and Telnet to access one another's devices. In addition to firewall rules, IBM uses a variety of measures to test and verify the effectiveness of the firewalls on an ongoing basis. These include port scanning, packet sniffing, and ethical hacking. These tests are conducted to confirm that the firewall rulesets can protect each customer in the Linux virtual services environment.

In addition to a standard set of firewall rules, custom firewall rules can be implemented if you require additional or alternative capabilities.

Firewall options

Custom firewall rules may be implemented if you require. For example, although IBM standard rules limit your publicly addressable interface to HTTP, Secure Shell (SSH), and Secure Mail Transfer Protocol (SMTP) traffic and functions, you may require additional or alternative capabilities.

Additional firewall protection

The Linux virtual firewalls are not the only firewalls protecting your hosting environment—in fact, they work behind a layer of security present in the IBM e-business Hosting Center. Standard infrastructure firewalls that exist outside the virtual cage help provide facility-level protection for all IBM hosting customers. What's more, an external firewall can be added to your Linux virtual services solution. Designed to provide additional front-end protection, this is a custom element and requires a dedicated OSA adapter.

Service units

Linux virtual services are purchased on the basis of "service units"—essentially, the processing capacity you require for your solution. These service units encompass the CPU, channel, OSA adapters, memory and internal cache of the zSeries mainframe, plus power and floor space, operating system and management labor.

By analyzing your workload requirements, IBM will help you determine how many service units you will need for your Linux virtual services solution.

We will help you determine the number of service units you need. We begin by analyzing your workload requirements, and identifying your normal and peak operating periods. Then, we'll help you determine the number of service units you'll need to handle your workload requirements for each of

Highlights

your Linux instances during normal operation and scheduled peak periods. A scheduled peak is a prearranged period of time, normally used for batch processing. Up to an additional ten percent of your provisioned service units will be available at all times to cover any unexpected workload surges. This additional ten percent capacity is included at no additional charge.

Additional service units and Linux instances can be added as your business needs change.

Dynamic storage

Just as processing power can be purchased on demand in the form of service units, IBM Managed Hosting - Linux virtual services offers storage available for purchase on demand. This allows you to buy only the storage you need, and eliminate underused storage arrays or separate, underused hard drives on physical servers.

IBM Managed Storage Services—an important component of your Linux virtual services solution—offers reliable storage on demand.

Linux virtual services leverages IBM Managed Storage Services to provide you with discrete and reliable storage. The actual physical storage is provided by an IBM TotalStorage™ Enterprise Storage Server™ ("Shark").

We will assist you in determining the amount of storage units you will need for each Linux instance. Storage is sold in 1MB increments. Linux instances have a minimum required storage allocation, which ranges from 1,003MB for a basic server to 5,476MB for a WebSphere Application Suite server. You can request additional storage above and beyond the minimums.

Logical volume manager

With dynamic storage for Linux virtual services, you can take advantage of the logical volume manager (LVM) feature to more efficiently manage your disk space. The LVM online disk storage management subsystem has become a standard across Linux implementations.

LVM is a major building block for Linux because it allows Linux to be used in an enterprise server environment. LVM also offers ease-of-use for desktop users, by simplifying on-disk management of Linux file systems and volumes. Plus, the LVM subsystem provides high availability, because most volume management operations can be performed during runtime, while the logical storage is used by an application.

Highlights

Logical volume manager helps you more efficiently manage your disk space.

LVM supports enterprise-level volume management of disk and disk subsystems by grouping arbitrary disks into volume groups. The total capacity of volume groups can be allocated to logical volumes, which are accessed as regular block devices. LVM provides logical separation of storage, the ability to move data from one physical device to another while online, and dynamic block resizing. LVM also enables system administrators to upgrade systems, remove failing disks, reorganize workloads, and adapt to changing system needs, with a minimal amount of time and effort.

Complementary services

A rich set of complementary storage services are available to support your Linux virtual services environment, including:

- *Standard backup and restore*
- *Offsite data storage*
- *Dedicated backup and restore*
- *Storage assistance*
- *Tape library partition*

Capacity on demand

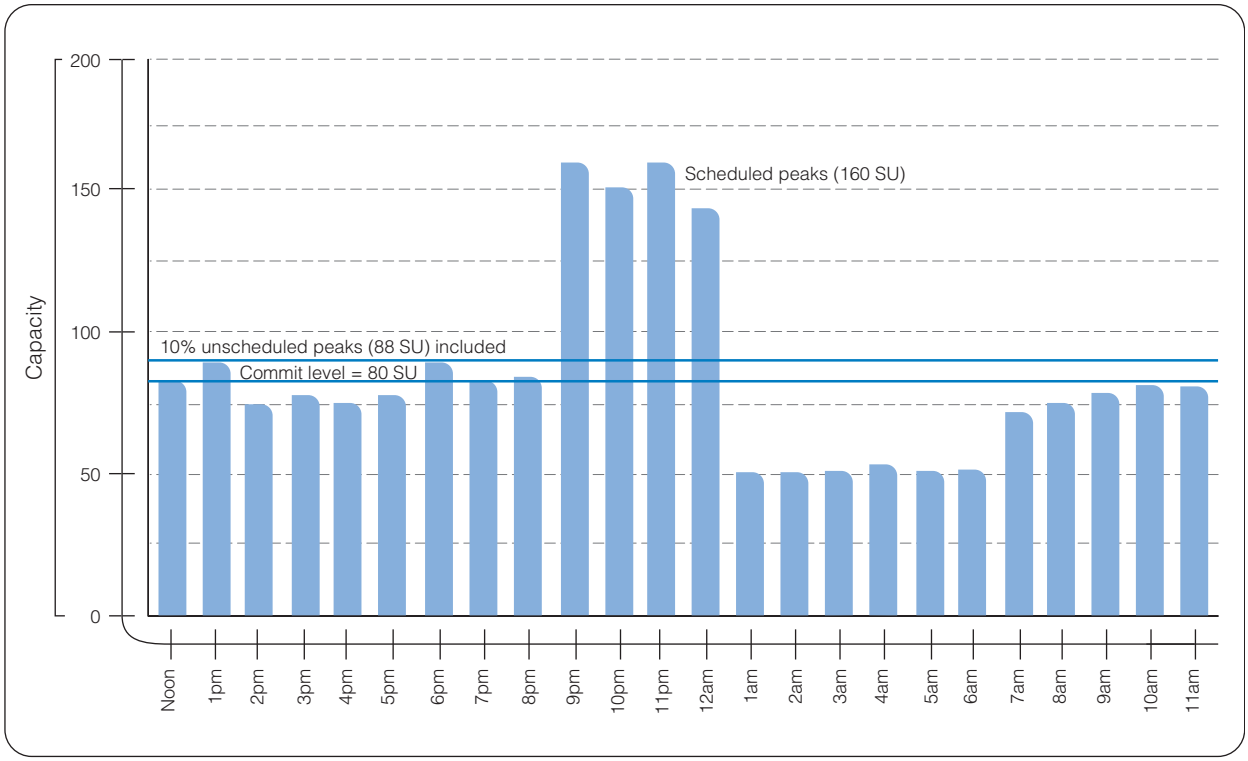
With IBM Managed Hosting - Linux virtual services, you can:

- *Pay only for the processing capacity you need*
- *Pay based on average capacity instead of peaks*
- *Handle regular workload peaks, such as during batch processing*
- *Rely on built-in safeguards for unanticipated surges*
- *Add more capacity whenever you need it*

One of the key advantages of Linux virtual services is the ability to purchase processing capacity based on steady-state requirements, and to add more capacity on demand, as needed.

The ability to purchase capacity on demand is one of the key advantages of Linux virtual services. This "liquid" capacity is a truly revolutionary concept, because instead of having to make a large, up-front capital investment and provision a system capable of handling workload peaks, you pay only for the capacity you need, based on your steady-state requirements. With 40 percent overdeployments common in distributed environments, this can add up to significant savings.

Here's how it works: The number of service units you contract for is actually a monthly average of your usage. In the example shown in the graph below, the customer pays for 80 service units a month, even though their workload sometimes peaks to 160 service units. In this example, the workload peaks are scheduled each day between 9:00 p.m. and 12:00 midnight. However, at other times, the customer's workload falls as low as 50 service units. What's more, protection against unexpected workload surges is built in, with ten percent additional capacity included at no additional charge.



Workload peaks must be scheduled in advance. If your workload surges beyond the ten percent additional capacity included for this purpose, you will be notified and advised to contract for a larger number of service units in the following month. While you are not required to purchase more, it is recommended.

Highlights

In addition to standard monitoring and reporting included with your Linux virtual services solution, you have the option of selecting additional monitoring tools for detailed performance and capacity management.

Linux instance management provides proactive system administration and management services for each of your virtual servers.

Standard monitoring and Linux instance management

Your IBM Managed Hosting - Linux virtual services environment includes IP ping and URL monitoring as part of your virtual cage. For managed Linux servers—the DB2 server, WebSphere Application server, WebSphere Commerce Suite server and network-attached storage server—monitoring for managed servers is a prerequisite. This includes proactive monitoring and reporting on the performance and capacity of your server configuration, provided using monitoring tools developed by BMC Software. Alerts generated by these services are sent to you and to IBM support staff. Should a problem arise, we will perform the initial problem determination and respond to the monitoring alert.

We will provide you with monthly storage and service usage reports via e-mail. We will also notify you via e-mail if any of your Linux instances reach 80 percent of capacity in a single day. System availability reports are available upon request.

IBM provides a service level objective for the infrastructure components of this offering that strives to achieve 99.9 percent availability for Linux instances.

Complementary services

You may select from a range of optional monitoring tools that offers detailed performance and capacity management. The monitoring services available to support your Linux virtual services environment include:

- *Keynote Systems Perspective*
- *Site and component monitoring*
- *SurfAid™ Analytics*
- *Server monitoring*

Linux instance management

You can benefit from proactive system administration and management services for each of your virtual servers. With Linux instance management, IBM provides you with highly skilled server, network and architectural resources to manage and monitor each of your instances around the clock, every day of the year. We will respond to operating system alerts generated by our monitoring tools and perform corrective action to resolve any system or server faults.

Highlights

Unlike other managed offerings in the marketplace, we also provide alert correlation, initial problem determination, and corrective actioning for pre-defined events. This means you won't be troubled by false alerts, and we can take care of many issues without your intervention.

While Linux instance management is required for the DB2 server, WebSphere Application server, WebSphere Commerce Suite server and network-attached storage server, it is also available as an option for the base Linux server and Linux Web server.

Different levels of support—ranging from 5 hours to 30 hours per month—are available for your solution. Support hours are pooled among multiple virtual servers.

Linux instance management is available in four support levels. Each level offers the same group of management services, but includes a different number of support hours. We provide guidelines to help you determine which level would be most appropriate for your solution, but you are free to choose whatever level you wish. If you have multiple virtual servers, your support hours will be pooled and can be used to support any of your managed servers. The levels of support are:

- *Entry (5 hours)*
- *Low (10 hours)*
- *Medium (20 hours)*
- *High (30 hours)*

In the event of problems or outages, IBM will assume initial problem determination responsibilities, after which point you can execute corrective measures yourself or direct us to do so.

Vulnerability scanning is integrated into Linux instance management, and scans are performed weekly. Security policy checking, also part of this service, is provided by RHLinuxCops and is performed monthly. Monitoring for managed servers is a corequisite and uses BMC Patrol, which we will install and configure. If a problem or outage should occur, you would be alerted via e-mail, but we will assume initial problem determination responsibilities. You have the option of executing corrective measures, or you can direct us to do so, using your monthly allocation of support hours. If your allocation of hours has been exhausted, you can purchase additional support time on an hourly basis.

Highlights

The number of support hours you will need to manage your Linux virtual services solution will depend on a number of factors, such as the number and complexity of your servers as well as their stability and amount of change activity.

We will also work with you to establish a pool of predefined events and appropriate corrective procedures. Should a predefined error occur, we can automatically take corrective action without need for your direction. Proactive problem response is available around the clock, and we will respond to problem notification within 15 minutes. We will respond to your requests made during business hours (8:00 a.m. to 6:00 p.m., business days) within two hours of your request.

Which level of support should I choose?

Carefully consider the overall complexity and stability of your virtual server environment, then choose the level of support that seems appropriate. The time it takes to manage a server is based on numerous factors and can vary from month to month, depending on changes, patches, problems, enhancements, and more. The following guidelines may help you decide on the level that's right for you; remember that your server support hours are pooled and can be used in support of any of your managed Linux servers.

7–12 hours per month

- *Low-end base Linux servers or Web servers*
- *Stable production servers*
- *Minimal changes*
- *Low file system/LVM complexity*

15–25 hours per month

- *Application or small database servers*
- *WebSphere Application Suite servers or DB2 servers*
- *Stable production servers*
- *Moderate change activity*
- *Normal file system/LVM complexity*

20–30 hours per month

- *Complex applications*
- *WebSphere Commerce Suite servers*
- *High-end servers*
- *High change activity*
- *Large database servers*
- *Unstable development servers*
- *Complex file system/LVM configurations*

Highlights

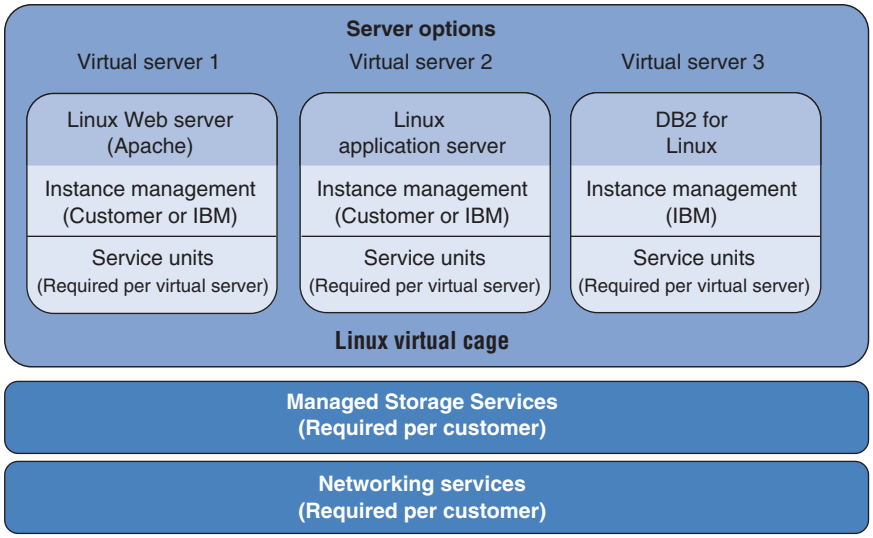
A virtual server provides you with processing, storage and network capacity—all available to you on demand—on which you can run the applications of your choice.

Server options: Linux virtual server

What is a virtual server? It is the combination of the amount of processing, storage and network capacity you need—all available to you on an on-demand basis. Each virtual server, or Linux instance, is completely isolated from others running on the zSeries.

To help you put your virtual servers to work quickly, IBM Managed Hosting - Linux virtual services offers a choice of "ready-to-go" server platforms. The most versatile is the base Linux server, which you can use to run the applications of your choice, or as a Linux "sandbox." A wide range of Linux-based independent software vendor (ISV) and business applications are already available for you to choose from, with more being developed every day. See the "Application support for Linux" section for details.

Linux virtual services sample environment



The base Linux virtual server offers you a security-rich, standardized and scalable e-business platform for your applications. We harden Linux virtual servers using a standard set of rules. Telnet is installed to give you administrative access to your virtual server. Postfix—chosen for its security and simplicity—is installed and configured, but left inactive. You can enable this feature to take advantage of SMTP and POP3 mail services, or have IBM

Highlights

enable it for you using Linux assistance services. Plus, because we archive the Linux server images, it takes only minutes to rebuild a downed server, as compared to the hours or days a rebuild can take in a physical environment.

You can manage your base Linux server(s) yourself, or select Linux instance management and have IBM manage it for you.

Technical snapshot

- *Virtual server: SuSE Linux 2.4 Kernel Version SuSE SLES-7*
- *Dynamic storage required: 2,634MB minimum*
- *Prerequisites: Virtual cage; networking services*

Server options: Linux Web server

The Linux virtual Web server offers the power and bandwidth you need to have a presence on the Internet without the cost of maintaining a dedicated server. You can reach the homes and businesses that are online each day and present a professional appearance to your customers, while saving money on your infrastructure. What's more, you can add security features and encryption to your virtual Web server if your business requires it. By protecting your customers' transactions, you can help them feel confident using credit cards online, and this can help you to build more business.

You can have a presence on the Internet without the cost of maintaining a dedicated server by choosing the Linux Web server option.

The Linux Web server is based on the Apache platform—one of the most popular Web servers on the market today. Apache is substantially faster, more stable and feature-rich than many other Web servers. It is estimated that a majority of the world's Web servers are running Apache—including those that get many millions of hits per day—without performance difficulties.

Based on the NCSA (National Center for Supercomputing Applications) public domain HTTPd server, Apache has become a major project in the open-source community. Many extensions, CGI scripts, Java™ applets and popular third-party applications are available for it.

Along with Apache Web server software, Telnet is installed on your Linux Web server, to provide you with administrative access. Postfix—chosen for its security features and simplicity—is installed and configured, but left inactive. You can enable this feature to take advantage of SMTP and POP3 mail services, or have IBM enable it for you using Linux assistance services.

Highlights

You can manage your Linux Web server(s) yourself, or choose Linux instance management and have IBM manage it for you.

Technical snapshot

- *Virtual server: SuSE Linux 2.4 Kernel Version SuSE SLES-7*
- *Apache Web server software, version 1.3*
- *Dynamic storage required: 2,634MB minimum*
- *Prerequisites: Virtual cage; networking services*

DB2 Universal Database allows you to use a single database for all your application needs, including managing mission-critical data on Linux and embedded Linux devices.

Server options: DB2 for Linux

The state-of-the-art database from IBM, DB2 Universal Database™ (UDB) is a relational database management system that manages data on a variety of platforms, including Linux. Among the most scalable databases in production today, DB2 can run on virtually everything from laptops supporting mobile users to massively parallel systems with terabytes of data and thousands of users. This allows you to use a single database for all your application needs, no matter what the scale—reducing costs and optimizing personnel skills. What's more, with IBM DB2 Everyplace™, you can manage mission-critical data on Linux and embedded Linux devices.

DB2 supports and embraces open standards, including Java and XML, and integrates with many open-source products, such as Apache, PHP, Perl and Python. DB2 Version 7.2 for Linux incorporates a number of scalability enhancements, including support for:

- *64-bit exploitation on IBM AIX®, Sun Solaris and HP-UX platforms*
- *Advanced Windowing Enhancement (AWE) application programming interfaces (APIs) on Microsoft® Windows® 2000 that allow users to define buffer pools to exploit up to 64GB of main memory*
- *Linux 2.4 kernel, with exploitation of raw devices, large files and better SMP scalability*

Technical snapshot

- *IBM DB2 Universal Database Enterprise Edition for Linux for zSeries and S/390®, Version V7.2*
- *Dynamic storage required: 2,634MB minimum*
- *Prerequisites: Virtual cage; networking services; Linux instance management; monitoring for managed servers; database support*

Highlights

Featuring extensive performance scaling, security features and control for advanced e-business applications, WebSphere can help you stay one step ahead of the technology curve.

Server options: WebSphere Application Server for Linux

Leverage your e-business with one of the most rapidly growing e-business platforms: WebSphere. The WebSphere software platform is a bundle of products that can be pieced together for e-business. WebSphere Application Server includes the core software to deploy, integrate and manage e-business applications. It offers extensive performance scaling, security features and control for your advanced e-business applications. WebSphere is specially designed to grow with the needs of your business—so you can stay one step ahead of the technology curve.

WebSphere Application Server for Linux includes DB2, plus:

Web services: Speed your application development with full Web services—SOAP, UDDI, WSDL, XML and J2EE 1.2 (Java 2 Enterprise Edition platform) certification—including robust integration and transaction technology.

Database support: Leverage your existing assets with virtually unparalleled connectivity via CORBA and ActiveX interoperability; plus expanded database support.

Programming model extensions: Manage your changing e-business with Web services and J2EE programming model extensions.

- *Internationalization allows for intelligent adjustments in business logic to accommodate client locales for time zones, currencies and languages*
- *Business Rule Beans enable dynamic updates without coding when business practices change*
- *Shared work areas let you efficiently share dynamic customer information from one end of a distributed application to the other*

Performance enhancements: Move at lightning speed with performance enhancements that include dynamic reload of Enterprise Java Beans (EJBs), dynamic caching (multitier), Java Naming and Directory Interface (JDNI) caching, and more.

Highlights

Technical snapshot

- *WebSphere Application Server V4.0.4 for Linux for S/390 and zSeries*
- *IBM DB2 Universal Database Enterprise Edition for Linux for zSeries and S/390, Version V7.2*
- *Dynamic storage required: 5,476MB minimum*
- *Prerequisites: Virtual cage; networking services; Linux instance management; monitoring for managed servers; middleware support*

Server options: WebSphere Commerce Suite for Linux

Whether you are building a business on the Web, or expanding your business to the Web, IBM WebSphere Commerce Suite will help propel you into the next generation of e-commerce.

WebSphere Commerce Suite helps take customer relationships to the next level by providing capabilities such as content management, order management, payments and fulfillment to support high-end e-commerce activities.

Next-generation e-commerce demands that your business deliver customer value beyond the transaction, while lowering your costs and accelerating return on investment. Value beyond the transaction means developing a customer-centric approach to e-commerce—whether your business model is business-to-business or business-to-consumer. This means touching customers wherever they are, forging new customer relationships and growing existing ones—relationships that will help generate new revenue and increase your profit margins.

Now you can take these relationships further with WebSphere Commerce Suite—a comprehensive software solution for e-commerce that is designed to provide content management, marketing, order management, customer management, payments and fulfilment. You can establish effective, high-end electronic commerce activity with this suite of e-business solutions.

- *Manage business relationships and complex industrial processes with IBM WebSphere Commerce Business Edition, Version 5.4*
- *Drive new revenue from your digital assets with IBM WebSphere Commerce Suite for Digital Media*
- *Use the Internet to reach your customers in innovative ways with IBM MerchantReach™ for e-commerce*

Highlights

With WebSphere Commerce Suite, companies of all sizes can implement a flexible and reliable e-commerce site to help generate new revenue and increase profit margins.

These open-standards-based e-commerce solutions let companies of all sizes compete on a level playing field. Flexible, scalable, security-rich and proven, IBM WebSphere Commerce Suite is designed to give you a solid platform to:

- *Get a site up and running quickly and cost-effectively*
- *Employ virtual teaming and project management through new collaboration functionality*
- *Establish and sustain valuable customer relationships*
- *Conduct e-business on a global scale with confidence*
- *Get to market faster*
- *Reduce sourcing and transaction costs*
- *Streamline purchasing processes*
- *Integrate your Web site with existing business-critical processes and systems*
- *Adapt on the fly as markets shift and business goals evolve*
- *Solidify relationships with buyers, trading partners and suppliers*
- *Clearly distinguish your e-business from the competition.*

WebSphere Commerce Suite for Linux includes WebSphere Application Server and DB2. You must register each unique production WebSphere Commerce Suite store that you create on your WebSphere Commerce Suite instance. A "store" in this case is actually a store back office, and several storefronts may access the same back office to permit handling of all commerce transactions in a consistent manner across storefronts.

Technical snapshot

- *IBM WebSphere Commerce Business Edition for Linux for IBM @server zSeries and S/390, V5.4*
- *WebSphere Application Server V4.0.4 for Linux for S/390 and zSeries*
- *IBM DB2 Universal Database Enterprise Edition for Linux for zSeries and S/390, Version V7.2*
- *Dynamic storage required: 5,476MB minimum*
- *Prerequisites: Virtual cage; networking services; Linux instance management; monitoring for managed servers; middleware support*

Highlights

For a cost-effective alternative to a storage area network, you can share storage among all your Linux instances by using one Linux instance as a dedicated network-attached storage server.

Server options: Network-attached storage for Linux

Use one of your Linux instances as a dedicated, IBM-managed network-attached storage (NAS) server to provide storage that can be shared among all your Linux instances within your virtual cage. The physical storage used by IBM Managed Hosting - Linux virtual services is an IBM TotalStorage Enterprise Storage Server ("Shark"), divided into logical VM minidisks. This storage appears as raw disks to Linux, and can be formatted and configured as one or more file systems. These file systems can then be exported to any or all systems on the same trusted virtual network (the network specific to your virtual router).

Using IP logical network connections versus physical SCSI or fibre connections, exported file systems can be shared by any Linux instances on the same trusted virtual network that have access to mount those exports. Full security measures are provided via file locking, which is handled using standard network locking protocols between the NAS server and NAS clients. Your network-attached storage is not exportable to the Internet. Further, NAS for Linux uses the Network File System (NFS), and these are the only protocols that can be served by your NAS server.

NAS is a cost-effective alternative to a storage area network (SAN), and is ideal if you have high volumes of data, but less latency-sensitive applications—e-mail, for example. Some business environments are ideally suited to NAS and file sharing, such as:

- *Web serving—Web pages, Web mail and streaming content*
- *Storing large amounts of pictures or audio—imaging, oil exploration and media serving*
- *Sharing knowledge—best practices and document templates*
- *Software development—code and test beds.*

Technical snapshot

- *Network file system*
- *Dynamic storage required: 2,634MB minimum*
- *Prerequisites: Virtual cage; Linux instance management*

Highlights

High availability services are available to provide active/passive failover between two identical virtual server instances.

Your virtual environment is protected by multiple layers of security.

High availability services

When uptime is critical, high availability services can give you an extra measure of confidence. This optional service provides active/passive failover between two virtual server instances (primary and backup). To achieve this, you must have two server instances that are identical. A virtual IP address is owned by the primary server. When the backup server detects that the primary server has gone down, it assumes the virtual IP address and handles client requests.

Failover is enabled at the operating system level; however, you must configure the application level to support failover, or have IBM do so, using Linux assistance services.

High availability—or redundancy—clusters can be designed to provide very high uptimes for a single application. Two server clones run duplicate copies of the application, and a monitoring system is set to detect the failure of one of the servers. High availability services can provide:

- *High reliability*
- *More consistent and predictable performance*
- *Improved user experience and Web stickiness*

Technical snapshot

- *Prerequisites: Two identical server instances*
- *Servers supported: Base Linux server; Linux Web server*

Linux virtual services security

From the infrastructure to the operating system, IBM Managed Hosting - Linux virtual services includes multiple layers of security that offer protection for your virtual environment. IBM has employed a team of network, VM, Linux, and security experts to provide a solution that isolates each customer environment from any others running on the zSeries. What's more, a full range of security tests have shown that the Linux virtual services environment is security-rich.

Highlights

The security features and procedures in place at IBM e-business Hosting Centers comprise the first layer of Linux virtual services security.

The architecture of Linux virtual services allows each customer's environment to be isolated from all others on the system.

IBM e-business Hosting Center security features

The first layer of Linux virtual services security lies in the IBM e-business Hosting Center infrastructure. Every IBM e-business Hosting solution benefits from the inherent safeguards, IBM security processes, tools and security options that are part of an IBM e-business Hosting Center.

We take a proactive approach to security by helping to minimize security exposure and risk in order to prevent intrusions from happening. The fundamental elements of IBM e-business Hosting security are designed to allow customers to functionally run their e-business with greater confidence. These fundamental elements include:

- *Physical security measures built into the structure of the IBM e-business Hosting Center*
- *Skilled IBM technical and support personnel*
- *Our extensive corporate and architecture-specific security policies and procedures*
- *Attention to industry-recognized security practices*
- *A security tool set incorporated into each type of e-business Hosting solution and architecture.*

Linux virtual services architecture security features

The cornerstone of Linux virtual services is the isolation of your virtual environment. Through the use of virtual firewalls and routers, each customer's environment—including memory, CPU and storage—is isolated from the other environments on the system. This ensures that if another customer experiences a denial of service attack against their firewall/router, or a system crash, there will be no effect on your—or any other customer's—environment.

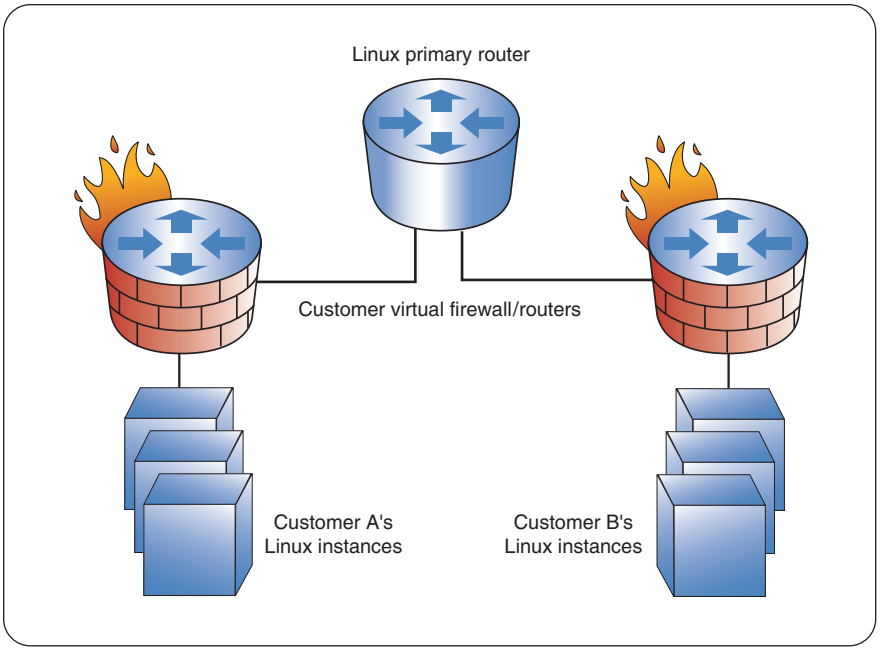
The Linux virtual services architecture is unique, and is thus governed by a number of rigorous, mandatory and recommended security policies. The following security services are incorporated into the Linux virtual services architecture:

- *Dedicated firewalls and routers are part of every customer's environment, providing isolation from other customers and allowing only necessary Internet traffic*
- *IBM also manages the access controls as dictated by strict security policies and procedures*

Highlights

- *A security tool set maintains the continued security of the Linux virtual services environment*
- *We conduct semiannual security health checks and annual security assurance reviews of selected systems.*

As shown in the diagram below, each customer has a dedicated firewall/router to support their individual security needs.



The IBM-built and safeguarded version of the Linux operating system is "locked down" to provide an added layer of security.

Linux operating system security features

Linux virtual services leverages an IBM-built and safeguarded version of the Linux operating system. Measures have been taken to "lock down" the default install of the Linux OS to help ensure that you are given a security-rich environment from the start. Most services have been turned off, which creates an extra layer of security behind the firewall by preventing access to unnecessary resources. We can selectively activate any of these services as you need them.

Highlights

We have also instituted a Linux security policy that outlines the configuration changes required for the Linux operating system build. Some of these include:

- *Password requirements*
- *Logging requirements*
- *Process accounting*
- *Kernel compile options*
- *Configuration changes to promote file security*
- *Removal or disabling of unnecessary services*

VM security features

Linux virtual services harnesses IBM VM Virtual Machines technology—each Linux instance runs on its own virtual machine and is allocated resources using VM partitioning technology. IBM has been developing and perfecting the virtual server technology contained within z/VM for more than 35 years; thus, the chances of a new exposure being identified are extremely small.

IBM z/Architecture allows each virtual machine to be isolated from every other virtual machine.

IBM z/Architecture is at the core of the system's ability to maintain integrity, and includes the critical ability to keep each virtual machine isolated from every other virtual machine. This isolation even extends to the VM Control Program, because it is logically separate from all the virtual machines in the system. The Control Program's native security capabilities are augmented by an External Security Manager (ESM) product, such as IBM Resource Access Control Facility for VM (RACF).

Security tools and testing

Along with the security tools that are inherent to the IBM e-business Hosting Center infrastructure, a number of specialized tools have been added to the Linux operating system.

Highlights

The Linux virtual services environment had to pass a number of rigorous security tests before being offered to customers.

Before making Linux virtual services available to customers, IBM conducted a number of security tests against the environment. Using the services of our own expert Ethical Hacking team, a thorough set of tests was run to verify that Linux virtual services could support multiple customers without affecting individual availability, performance or resources. Some of these tests included:

- *Denial of service attacks*
- *Packet sniffing traffic from one customer to another*
- *Port scanning*
- *Self-imposed crashing of one customer's Linux instance to try to affect other customers' availability, performance or resources*

Linux virtual services passed all of these tests, illustrating that the dedicated firewalls provide a high level of security and isolation. A report from the Ethical Hacking team stated, "… the security of the customer virtual routers is excellent."

Optional security tools

To complement the security features built into Linux virtual services, a range of optional security services is available, including:

To complement the security features inherent to Linux virtual services, a variety of optional security services is available.

- *Incident management*
- *Vulnerability scanning*
- *Virus alert*
- *Security health check*
- *Ethical hacking*
- *Information asset profile*
- *Privacy workshop*
- *Privacy strategy and implementation service*
- *Security policy definition*
- *Security standards definition*
- *Security process development*
- *Public key infrastructure business workshop*
- *Public key infrastructure planning and design*
- *Secure solution design*
- *Vulnerability assessment*

Highlights

Linux assistance services are available to augment your staff in managing your Linux virtual services environment.

Linux assistance services

This optional service provides you with skilled Linux assistance when you need it. Available on an hourly basis in blocks of five hours, Linux assistance services gives you on-call access to IBM Linux on zSeries specialists, and can help supplement your staff in support of your IBM Managed Hosting - Linux virtual services environment. This service is particularly recommended if you have limited or no Linux expertise to manage your environment.

Use this service for:

- *Installing and configuring IBM and ISV middleware for Linux*
- *Consolidating distributed servers to Linux*
- *Assistance with Linux services such as LVM and Postfix*
- *Firewall configurations*
- *Performance tuning*
- *Applying patches*
- *Application monitoring*
- *Linux problem determination*
- *Or, to meet your specific needs*

The IBM Call Management Center (CMC) is your single point of contact for Linux assistance services. We will respond to your request for assistance within 30 minutes of your call, and will schedule a mutually agreeable time for the requested assistance to be performed.

Complementary services

A range of optional services is available to support your IBM Managed Hosting - Linux virtual services solution. These services interact with your Linux environment just as they would with a physical solution. Contact your IBM sales representative for details on each of these services.

Network services

- *Internet connectivity*
- *Domain name services*
- *IP address services*

Highlights

You can choose from a range of complementary services—from network services to security services to application support—to round out your Linux virtual services solution.

Storage and backup services
- *Standard backup and restore*
- *Offsite data storage*
- *Dedicated backup and restore*
- *Storage assistance*
- *Tape library partition*

Security services
- *Incident management*
- *Vulnerability scanning*
- *Virus alert*
- *Security health check*
- *Ethical hacking*
- *Information asset profile*
- *Privacy workshop*
- *Privacy strategy and implementation service*
- *Security policy definition*
- *Security standards definition*
- *Security process development*
- *Public key infrastructure business workshop*
- *Public key infrastructure planning and design*
- *Secure solution design*
- *Vulnerability assessment*

Monitoring services
- *Keynote Perspective*
- *Site and component monitoring*
- *SurfAid Analytics*
- *Server monitoring*

Support services
- *Project management*
- *Customer support*

Highlights

Professional services
- *Site and infrastructure design*
- *Standard network logical design*
- *Solution integration assessment*

Application support services
- *Database support*
- *Middleware support*

Application support for Linux

Linux is the fastest-growing server operating system in the world today, and millions of users have already chosen it for applications that include Web and e-mail servers, departmental and enterprise vertical applications, and more. Because it offers access to a very large portfolio of applications, Linux can reduce your dependence on proprietary operating systems.

The IBM Global Solution Directory currently lists more than 2,800 Linux applications that are available, including:

Today, a large and growing number of applications are available for Linux, the world's fastest-growing operating system. Many have been developed specifically for Linux on zSeries.

- *More than 2,000 e-business applications*
- *681 Web application servers (Internet/intranet)*
- *406 e-commerce applications*
- *More than 400 Linux ServerProven® on xSeries™ solutions*

Highlights

Linux virtual services provides you with cost-effective managed server capacity on demand, while helping you avoid up-front capital expense and reduce time to market.

What's more, there is a substantial–and rapidly growing–group of applications especially for Linux on zSeries. You can learn more about these at: *http://www-1.ibm.com/servers/eserver/zseries/solutions/s390da/linuxproduct.html*. Below is a partial list of the vendors that support Linux on zSeries.

Software vendor support for Linux

AccPac International, Inc.	Legato Systems Inc.	SAP
Alabanza Corporation	Magic Software	SAS Institute Inc.
Appgen	MarCole Enterprises	Sendmail Inc.
Applix	Mission Critical	Sphera
Bynari	Oracle	SteelEye Technologies
Checkpoint	PeopleSoft	SuSE
Compuware	Polyserve	Tarantella
eOne	Progress Software	Trustix
Informix	Rational Software	VMware
Journyx	RealNetworks	…and many more

Is Linux virtual services right for your business?

Ask yourself the following questions:

- *Are you looking for ways to significantly reduce IT expenses?*
- *Are you constantly deploying distributed servers to keep up with the demands of a growing IT infrastructure?*
- *Are the individual servers in your infrastructure underutilized because each is performing a dedicated function?*
- *Does your infrastructure need to accommodate seasonal or daily peaks?*
- *Is the work being done by your current servers mainly I/O-intensive (such as Web serving)?*
- *Is Linux an approved component in your OS strategy, or would you like to learn more about its benefits?*

If you answered "yes" to any of these questions, then IBM Managed Hosting - Linux virtual services may be a good fit. And remember, Linux virtual services not only provides cost-effective managed server capacity on demand, it also allows you to leverage The Next Utility—e-business on demand—so you can:

- *Avoid up-front capital expense*
- *Pay on a monthly basis for the server capacity you need*
- *Simplify capacity planning—extra is on tap when required*
- *Handle regular workload surges, such as during batch processing*
- *Rely on built-in safeguards for unanticipated surges*
- *Deploy new virtual servers fast, and reduce time to market*

Rely on the experience of a global team

The people of IBM Global Services have extensive experience deploying and managing hosting solutions for companies of all sizes. IBM Managed Hosting - Linux virtual services builds on this foundation of experience and leverages our industry-leading support for Linux and the zSeries platform. You choose the amount of computing capacity, storage capacity and network capacity you need, and IBM does the rest. Provided through our world-class IBM e-business Hosting Centers, Linux virtual services gives you the equivalent of a physical infrastructure in a virtual environment—all backed by the expertise of IBM e-business Hosting professionals.

For more information

To learn more about Managed Hosting - Linux virtual services, contact your IBM sales representative or ask your IBM Business Partner about IBM e-business Hosting, and visit:

ibm.com/e-business/hosting

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1 Linux instance management is optional for the base Linux server and Linux Web server.

2 IBM will help you determine the number of service units you need, depending on your processing requirements. Ten percent additional capacity is included at no additional charge to cover unanticipated peaks.

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