

# Ibm Scale Out Network Attached Storage Concepts

Implementation Guide for IBM Elastic Storage System 3000IBM PowerVP: Introduction and Technical OverviewIntroduction to Storage Area Networks and System NetworkingIBM Flex System Products and Technology for Power SystemsIBM SmartCloud: Building a Cloud Enabled Data CenterScale Out Network Attached Storage MonitoringA Deployment Guide for IBM Spectrum Scale Unified File and Object StorageIBM Power System E980: Technical Overview and IntroductionUsing SANs and NASIBM Flex System p270 Compute Node Planning and Implementation GuideSONAS Implementation and Best Practices GuideThe Practice of System and Network AdministrationPerformance Optimization and Tuning Techniques for IBM Power Systems Processors Including IBM POWER8IBM Power 550 Technical OverviewIBM Scale Out Network Attached Storage ConceptsIBM Assist On-site for Storage OverviewIBM FlashSystem V9000 in a VersaStack EnvironmentStorage Networks ExplainedThe Enterprise CloudHortonworks Data Platform with IBM Spectrum Scale: Reference Guide for Building an Integrated SolutionImplementing Systems Management of IBM PureFlex SystemIBM Elastic Storage Server Implementation Guide for Version 5.3IBM Power 720 and 740 (8202-E4C, 8205-E6C) Technical Overview and IntroductionIBM Tivoli Storage Manager as a Data Protection SolutionSAP HANA on

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IBM Power Systems: High Availability and Disaster Recovery Implementation Updates  
IBM Information Infrastructure Solutions Handbook  
IBM Power System AC922 Introduction and Technical Overview  
IBM SONAS Implementation Guide  
IBM System Storage Business Continuity: Part 1 Planning Guide  
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IBM SONAS Best Practices  
Essentials of Application Development on IBM Cloud  
Harness the Power of Big Data  
The IBM Big Data Platform  
IBM Power Systems RAID Solutions Introduction and Technical Overview  
IBM Power Systems LC921 and LC922: Technical Overview and Introduction  
IBM Power Systems SR-IOV: Technical Overview and Introduction

### **Implementation Guide for IBM Elastic Storage System 3000**

### **IBM PowerVP: Introduction and Technical Overview**

### **Introduction to Storage Area Networks and System Networking**

This IBM® Redpaper™ publication is a comprehensive guide that covers the IBM

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Power Systems™ LC921 and LC922 (9006-12P and 9006-22P) servers that use the current IBM POWER9™ processor-based technology and supports Linux operating systems (OSes). The objective of this paper is to introduce the offerings and their capacities and available features. These new Linux scale-out systems provide differentiated performance, scalability, and low acquisition cost, and include the following features: Superior throughput and performance for high-value Linux workloads. Low acquisition cost through system optimization (industry-standard memory and industry-standard three-year warranty). Rich I/O options in the system unit. There are 12 large form factor (LFF)/small form factor (SFF) bays for 12 SAS/SATA hard disk drives (HDDs) or solid-state drives (SSDs), and four bays that are available for Non-Volatile Memory Express (NVMe) Gen3 adapters. Includes Trusted Platform Module (TPM) 2.0 Nuvoton NPCT650ABAWX through I2C (for secure boot and trusted boot). Integrated MicroSemi PM8069 SAS/SATA 16-port Internal Storage Controller Peripheral Component Interconnect Express (PCIe) 3.0 x8 with RAID 0, 1, 5, and 10 support (no write cache). Integrated Intel XL710 Quad Port 10 GBase-T PCIe 3.0 x8 UIO built-in local area network (LAN) (one shared management port). Dedicated 1 Gb Intelligent Platform Management Interface (IPMI) port. This publication is for professionals who want to acquire a better understanding of IBM Power Systems products. The intended audience includes: Clients Sales and marketing professionals Technical support professionals IBM Business Partners Independent software vendors (ISVs)

### **IBM Flex System Products and Technology for Power Systems**

This IBM® Redpaper™ publication provides a description and reference information for the IBM Assist On-site (AOS) software. It is intended for clients who want the benefit of the AOS advanced features, such as port forwarding, which allows an authorized IBM Support Service Representative (IBM SSR) to access a client's enabled storage device to diagnose and troubleshoot efficiently the device.

### **IBM SmartCloud: Building a Cloud Enabled Data Center**

This IBM® Redbooks® publication focuses on gathering the correct technical information, and laying out simple guidance for optimizing code performance on IBM POWER8® processor-based systems that run the IBM AIX®, IBM i, or Linux operating systems. There is straightforward performance optimization that can be performed with a minimum of effort and without extensive previous experience or in-depth knowledge. The POWER8 processor contains many new and important performance features, such as support for eight hardware threads in each core and support for transactional memory. The POWER8 processor is a strict superset of the IBM POWER7+™ processor, and so all of the performance features of the POWER7+ processor, such as multiple page sizes, also appear in the POWER8 processor. Much of the technical information and guidance for optimizing

performance on POWER8 processors that is presented in this guide also applies to POWER7+ and earlier processors, except where the guide explicitly indicates that a feature is new in the POWER8 processor. This guide strives to focus on optimizations that tend to be positive across a broad set of IBM POWER® processor chips and systems. Specific guidance is given for the POWER8 processor; however, the general guidance is applicable to the IBM POWER7+, IBM POWER7®, IBM POWER6®, IBM POWER5, and even to earlier processors. This guide is directed at personnel who are responsible for performing migration and implementation activities on POWER8 processor-based systems. This includes system administrators, system architects, network administrators, information architects, and database administrators (DBAs).

### **Scale Out Network Attached Storage Monitoring**

### **A Deployment Guide for IBM Spectrum Scale Unified File and Object Storage**

This IBM® Redbooks® publication is designed to teach university students and app developers the foundation skills that are required to develop, test, and deploy cloud-based applications on IBM Cloud. It shows the latest features of IBM Cloud for

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developing cloud applications, enhancing applications by using managed services, and the use of DevOps services to manage applications. This book is used as presentations guide for the IBM Skills Academy track Cloud Application Developer and as preparation material for the IBM professional certification exam IBM Certified Application Developer - Cloud Platform. The primary target audience for this course is university students in undergraduate computer science and computer engineer programs with no previous experience working in cloud environments. However, anyone new to cloud computing or IBM Cloud can also benefit from this course.

### **IBM Power System E980: Technical Overview and Introduction**

Organizations are looking for ways to get more out of their already strained IT infrastructure as they face new technological and economic pressures. They are also trying to satisfy a broad set of users (internal and external to the enterprise) who demand improvements in their quality of service (QoS), regardless of increases in the number of users and applications. Cloud computing offers attractive opportunities to reduce costs, accelerate development, and increase the flexibility of the IT infrastructure, applications, and services. Infrastructure as a service (IaaS) is the typical starting point for most organizations when moving to a cloud computing environment. IaaS can be used for the delivery of resources such as compute, storage, and network services through a self-service portal. With IaaS,

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IT services are delivered as a subscription service, eliminating up-front costs and driving down ongoing support costs. IBM® has defined the Cloud Computing Reference Architecture (CCRA) based on years of experience of working with customers who have implemented cloud-computing solutions. The IBM CCRA is a blueprint or guide for architecting cloud-computing implementations. This IBM Redguide™ publication highlights the Cloud Enabled Data Center adoption pattern and describes how you can use it to define an IaaS solution. This guide is intended for chief technology officers, data center architects, IT architects, and application architects who want to understand the cloud-computing infrastructure necessary to support their applications and services by using an IaaS solution. It explains the technical and business benefits of a Cloud Enabled Data Center solution. It introduces a Cloud Enabled Data Center maturity model where each maturity level corresponds to an increase in the degree of automation and the cloud-computing capabilities that are available. In addition, this guide describes the architectural framework provided by the IBM CCRA and explains details about the Cloud Enabled Data Center adoption pattern.

### **Using SANs and NAS**

This IBM® Redpaper™ publication is a comprehensive guide covering the IBM Power 720 and Power 740 servers supporting AIX®, IBM i, and Linux operating systems. The goal of this paper is to introduce the innovative Power 720 and Power

740 offerings and their major functions, including these: The POWER7™ processor available at frequencies of 3.0 GHz, 3.55 GHz, and 3.7 GHz. The specialized POWER7 Level 3 cache that provides greater bandwidth, capacity, and reliability. The 2-port 10/100/1000 Base-TX Ethernet PCI Express adapter included in the base configuration and installed in a PCIe Gen2 x4 slot. The integrated SAS/SATA controller for HDD, SSD, tape, and DVD. This controller supports built-in hardware RAID 0, 1, and 10. The latest PowerVM™ virtualization including PowerVM Live Partition Mobility and PowerVM Active Memory™ Sharing. Active Memory Expansion that provides more usable memory than what is physically installed on the system. EnergyScale™ technology that provides features such as power trending, power-saving, capping of power, and thermal measurement. Professionals who want to acquire a better understanding of IBM Power Systems products can benefit from reading this paper. This paper expands the current set of IBM Power Systems documentation by providing a desktop reference that offers a detailed technical description of the Power 720 and Power 740 systems. This paper does not replace the latest marketing materials and configuration tools. It is intended as an additional source of information that, together with existing sources, can be used to enhance your knowledge of IBM server solutions.

### **IBM Flex System p270 Compute Node Planning and Implementation Guide**

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This IBM® Redpaper™ is a comprehensive guide covering the Power 550 server. The goal of this paper is to introduce the innovative Power 550. It introduces major hardware offerings and discusses their prominent functions, including:

- o The POWER6 processor available at frequencies of 3.5 GHz, 4.2 GHz, and 5.0 GHz.
- o The specialized POWER6 DDR2 memory that provides greater bandwidth, capacity, and reliability.
- o The 1 Gb or 10 Gb Integrated Virtual Ethernet adapter that brings native hardware virtualization to this server
- o EnergyScale technology that provides features such as power trending, power-saving, capping of power, and thermal measurement
- o PowerVM Live Partition Mobility
- o Mainframe continuous availability brought to the UNIX environment

This Redpaper expands the current set of IBM System p documentation by providing a desktop reference that offers a detailed technical description of the 550 system. This Redpaper does not replace the latest marketing materials and tools. It is intended as an additional source of information that, together with existing sources, may be used to enhance your knowledge of IBM server solutions.

### **SONAS Implementation and Best Practices Guide**

This IBM® Redpaper™ publication is a comprehensive guide that covers the IBM Power System AC922 server (8335-GTG and 8335-GTW models). The Power AC922 server is the next generation of the IBM Power processor-based systems, which are designed for deep learning and artificial intelligence (AI), high-performance

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analytics, and high-performance computing (HPC). This paper introduces the major innovative Power AC922 server features and their relevant functions: Powerful IBM POWER9™ processors that offer 16 cores at 2.6 GHz with 3.09 GHz turbo performance or 20 cores at 2.0 GHz with 2.87 GHz turbo for the 8335-GTG Eighteen cores at 2.98 GHz with 3.26 GHz turbo performance or 22 at 2.78 GHz cores with 3.07 GHz turbo for the 8335-GTW IBM Coherent Accelerator Processor Interface (CAPI) 2.0, IBM OpenCAPITM, and second-generation NVIDIA NVLink technology for exceptional processor-to-accelerator intercommunication Up to six dedicated NVIDIA Tesla V100 GPUs This publication is for professionals who want to acquire a better understanding of IBM Power Systems™ products and is intended for the following audiences: Clients Sales and marketing professionals Technical support professionals IBM Business Partners Independent software vendors (ISVs) This paper expands the set of IBM Power Systems documentation by providing a desktop reference that offers a detailed technical description of the Power AC922 server. This paper does not replace the current marketing materials and configuration tools. It is intended as an extra source of information that, together with existing sources, can be used to enhance your knowledge of IBM server solutions.

### **The Practice of System and Network Administration**

IBM® Scale Out Network Attached Storage (SONAS) is a Scale Out NAS offering

designed to manage vast repositories of information in enterprise environments requiring very large capacities, high levels of performance, and high availability. The IBM SONAS appliance provides a range of reliable, scalable storage solutions for a variety of storage requirements. These capabilities are achieved by using network access protocols such as NFS, CIFS, HTTPS, FTP, and SCP. Using built-in RAID technologies, all data is well protected with options to add additional protection through mirroring, replication, snapshots, and backup. These storage systems are also characterized by simple management interfaces that make their installation, administration, and troubleshooting uncomplicated and straightforward. This IBM Redbooks® publication is the companion to the IBM Redbooks publication, SONAS Concepts, Architecture, and Planning Guide, SG24-7963. It is intended for storage administrators who have ordered their SONAS solution and are ready to install, customize, and use it. A quick start scenario takes you through common SONAS administration tasks to familiarize you with the SONAS system through the GUI and CLI. Backup and availability scenarios as well as best practices for setting up and troubleshooting hints and tips are included.

### **Performance Optimization and Tuning Techniques for IBM Power Systems Processors Including IBM POWER8**

### **IBM Power 550 Technical Overview**

When you hear IBM® Tivoli® Storage Manager, the first thing that you typically think of is data backup. Tivoli Storage Manager is the premier storage management solution for mixed platform environments. Businesses face a tidal wave of information and data that seems to increase daily. The ability to successfully and efficiently manage information and data has become imperative. The Tivoli Storage Manager family of products helps businesses successfully gain better control and efficiently manage the information tidal wave through significant enhancements in multiple facets of data protection. Tivoli Storage Manager is a highly scalable and available data protection solution. It takes data protection scalability to the next level with a relational database, which is based on IBM DB2® technology. Greater availability is delivered through enhancements such as online, automated database reorganization. This IBM Redbooks® publication describes the evolving set of data-protection challenges and how capabilities in Tivoli Storage Manager can best be used to address those challenges. This book is more than merely a description of new and changed functions in Tivoli Storage Manager; it is a guide to use for your overall data protection solution.

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As IBM® Scale Out Network Attached Storage (SONAS) is adopted, it is important to provide information about planning, installation, and daily administration. This IBM Redbooks® publication also describes leading tuning practices information gained by those who implement and support SONAS. These preferred practices are based on hands-on experience from the field. Monitoring of the SONAS system is included. This IBM Redbooks publication provides information about IBM SONAS features and function at the 1.5.1 level. This book is the companion to the IBM SONAS Implementation Guide, SG24-7962 IBM Redbooks publication. It is intended for readers who have implemented SONAS and are responsible for daily administration and monitoring.

### **IBM Assist On-site for Storage Overview**

A disruption to your critical business processes could leave the entire business exposed. Today's organizations face ever-escalating customer demands and expectations. There is no room for downtime. You need to provide your customers with continuous service because your customers have a lot of choices. Your competitors are standing ready to take your place. As you work hard to grow your business, you face the challenge of keeping your business running without a glitch. To remain competitive, you need a resilient IT infrastructure. This IBM Redbooks publication introduces the importance of Business Continuity in today's IT environments. It provides a comprehensive guide to planning for IT Business

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Continuity and can help you design and select an IT Business Continuity solution that is right for your business environment. We discuss the concepts, procedures, and solution selection for Business Continuity in detail, including the essential set of IT Business Continuity requirements that you need to identify a solution. We also present a rigorous Business Continuity Solution Selection Methodology that includes a sample Business Continuity workshop with step-by-step instructions in defining requirements. This book is meant as a central resource book for IT Business Continuity planning and design. The companion title to this book, IBM System Storage Business Continuity: Part 2 Solutions Guide, SG24-6548, describes detailed product solutions in the System Storage Resiliency Portfolio.

### **IBM FlashSystem V9000 in a VersaStack Environment**

This IBM® Redpaper™ publication provides guidance on building an enterprise-grade data lake by using IBM Spectrum™ Scale and Hortonworks Data Platform for performing in-place Hadoop or Spark-based analytics. It covers the benefits of the integrated solution, and gives guidance about the types of deployment models and considerations during the implementation of these models. Hortonworks Data Platform (HDP) is a leading Hadoop and Spark distribution. HDP addresses the complete needs of data-at-rest, powers real-time customer applications, and delivers robust analytics that accelerate decision making and innovation. IBM Spectrum Scale™ is flexible and scalable software-defined file storage for

analytics workloads. Enterprises around the globe have deployed IBM Spectrum Scale to form large data lakes and content repositories to perform high-performance computing (HPC) and analytics workloads. It can scale performance and capacity both without bottlenecks.

### **Storage Networks Explained**

This IBM® Redpaper™ publication given an overview and technical introduction to IBM Power Systems™ RAID solutions. The book is organized to start with an introduction to Redundant Array of Independent Disks (RAID), and various RAID levels with their benefits. A brief comparison of Direct Attached Storage (DAS) and networked storage systems such as SAN / NAS is provided with a focus on emerging applications that typically use the DAS model over networked storage models. The book focuses on IBM Power Systems I/O architecture and various SAS RAID adapters that are supported in IBM POWER8™ processor-based systems. A detailed description of the SAS adapters, along with their feature comparison tables, is included in Chapter 3, "RAID adapters for IBM Power Systems" on page 45. The book is aimed at readers who have the responsibility of configuring IBM Power Systems for individual solution requirements. This audience includes IT Architects, IBM Technical Sales Teams, IBM Business Partner Solution Architects and Technical Sales teams, and systems administrators who need to understand the SAS RAID hardware and RAID software solutions supported in POWER8

processor-based systems.

### **The Enterprise Cloud**

An information infrastructure is comprised of software, servers, storage, and networks, integrated and optimized to deliver timely, secure, and trusted information throughout the organization and to its clients and partners. With the explosive growth in data and information—coupled with demands for projects with rapid ROI—IT infrastructures and storage administrators are reaching a breaking point. IBM® can help with the changes needed to manage information availability, security, and regulatory and compliance requirements on a tighter budget. And because the health of any business often depends on its ability to take advantage of information in real time, a sound, intelligent information infrastructure becomes critical to supporting new growth initiatives. IBM offers an innovative approach to help you manage information growth more effectively and mitigate risks with a dynamic infrastructure that efficiently and securely stores and protects information, and optimizes information access. You can control, protect, manage, and gain new intelligence from your information with the IBM leading-edge Information Infrastructure products, services and integrated solutions, supported by world-class expertise and access to top experts from around the world. This IBM Redbooks® publication provides an overview of the IBM Information Infrastructure solutions that are designed to help you manage the information explosion and

address challenges of information compliance, availability, retention, and security. This will lead your company toward improved productivity, service delivery, and reduced risk, while streamlining costs.

### **Hortonworks Data Platform with IBM Spectrum Scale: Reference Guide for Building an Integrated Solution**

This IBM® Redbooks® publication highlights IBM Technical Computing as a flexible infrastructure for clients looking to reduce capital and operational expenditures, optimize energy usage, or re-use the infrastructure. This book strengthens IBM SmartCloud® solutions, in particular IBM Technical Computing clouds, with a well-defined and documented deployment model within an IBM System x® or an IBM Flex System™. This provides clients with a cost-effective, highly scalable, robust solution with a planned foundation for scaling, capacity, resilience, optimization, automation, and monitoring. This book is targeted toward technical professionals (consultants, technical support staff, IT Architects, and IT Specialists) responsible for providing cloud-computing solutions and support.

### **Implementing Systems Management of IBM PureFlex System**

With 28 new chapters, the third edition of The Practice of System and Network

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Administration innovates yet again! Revised with thousands of updates and clarifications based on reader feedback, this new edition also incorporates DevOps strategies even for non-DevOps environments. Whether you use Linux, Unix, or Windows, this new edition describes the essential practices previously handed down only from mentor to protégé. This wonderfully lucid, often funny cornucopia of information introduces beginners to advanced frameworks valuable for their entire career, yet is structured to help even experts through difficult projects. Other books tell you what commands to type. This book teaches you the cross-platform strategies that are timeless! DevOps techniques: Apply DevOps principles to enterprise IT infrastructure, even in environments without developers Game-changing strategies: New ways to deliver results faster with less stress Fleet management: A comprehensive guide to managing your fleet of desktops, laptops, servers and mobile devices Service management: How to design, launch, upgrade and migrate services Measurable improvement: Assess your operational effectiveness; a forty-page, pain-free assessment system you can start using today to raise the quality of all services Design guides: Best practices for networks, data centers, email, storage, monitoring, backups and more Management skills: Organization design, communication, negotiation, ethics, hiring and firing, and more Have you ever had any of these problems? Have you been surprised to discover your backup tapes are blank? Ever spent a year launching a new service only to be told the users hate it? Do you have more incoming support requests than you can handle? Do you spend more time fixing problems than building the

next awesome thing? Have you suffered from a botched migration of thousands of users to a new service? Does your company rely on a computer that, if it died, can't be rebuilt? Is your network a fragile mess that breaks any time you try to improve it? Is there a periodic "hell month" that happens twice a year? Twelve times a year? Do you find out about problems when your users call you to complain? Does your corporate "Change Review Board" terrify you? Does each division of your company have their own broken way of doing things? Do you fear that automation will replace you, or break more than it fixes? Are you underpaid and overworked? No vague "management speak" or empty platitudes. This comprehensive guide provides real solutions that prevent these problems and more!

### **IBM Elastic Storage Server Implementation Guide for Version 5.3**

This IBM® Redbooks publication introduces and describes the IBM Elastic Storage® Server 3000 (ESS 3000) as a scalable, high-performance data and file management solution. The solution is built on proven IBM Spectrum® Scale technology, formerly IBM General Parallel File System (IBM GPFS). IBM Elastic Storage System 3000 is an all-Flash array platform. This storage platform uses NVMe-attached drives in ESS 3000 to provide significant performance

improvements as compared to SAS-attached flash drives. This book provides a technical overview of the ESS 3000 solution and helps you to plan the installation of the environment. We also explain the use cases where we believe it fits best. Our goal is to position this book as the starting point document for customers that would use ESS 3000 as part of their IBM Spectrum Scale setups. This book is targeted toward technical professionals (consultants, technical support staff, IT Architects, and IT Specialists) who are responsible for delivering cost-effective storage solutions with ESS 3000.

### **IBM Power 720 and 740 (8202-E4C, 8205-E6C) Technical Overview and Introduction**

Because of the explosion of unstructured data that is generated by individuals and organizations, a new storage paradigm that is called object storage has been developed. Object storage stores data in a flat namespace that scales to trillions of objects. The design of object storage also simplifies how users access data, supporting new types of applications and allowing users to access data by using various methods, including mobile devices and web applications. Data distribution and management are also simplified, allowing greater collaboration across the globe. OpenStack Swift is an emerging open source object storage software platform that is widely used for cloud storage. IBM® Spectrum Scale, which is

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based on IBM General Parallel File System (IBM GPFS™) technology, is a high-performance and proven product that is used to store data for thousands of mission-critical commercial installations worldwide. Throughout this IBM Redpaper™ publication, IBM Spectrum™ Scale is used to refer to GPFS. The examples in this paper are based on IBM Spectrum Scale™ V4.2.2. IBM Spectrum Scale also automates common storage management tasks, such as tiering and archiving at scale. Together, IBM Spectrum Scale and OpenStack Swift provide an enterprise-class object storage solution that efficiently stores, distributes, and retains critical data. This paper provides instructions about setting up and configuring IBM Spectrum Scale Object Storage that is based on OpenStack Swift. It also provides an initial set of preferred practices that ensure optimal performance and reliability. This paper is intended for administrators who are familiar with IBM Spectrum Scale and OpenStack Swift components.

### **IBM Tivoli Storage Manager as a Data Protection Solution**

"Storage Networks Explained has much to recommend it. a rarity in the literature of digital data storage – a complete exposition of both the base subject matter and its applications, which at the same time offers a level of readability making it suitable as an introduction to the subject. Storage Networks Explained is also flexible. It can be read cover-to-cover, browsed, or used as a reference. I recommend Storage Networks Explained as an essential component of any active

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information technology library." —Paul Massiglia, Technical Director, VERITAS Software Corporation Storage networks will become a basic technology like databases or local area networks. According to market research, 70% of external storage devices will be connected via storage networks in 2003. The authors have hands-on experience of network storage hardware and software, they teach customers about concrete network storage products, they understand the concepts behind storage networks, and show customers how storage networks address their business needs. Storage networks provide shared access to stored data from multiple computers and servers, thus increasing storage efficiency and availability. They permit information management functions such as backup and recovery, data mirroring, disaster recovery, and data migration to be performed quickly and efficiently, with a minimum of system overhead. This book explains how to use storage networks to fix malfunctioning business processes, covering the technologies as well as applications. A hot topic that will become increasingly important in the coming years. One of the first books to focus on using rather than building storage networks, and how to solve problems. Looking beyond technology and showing the true benefits of storage networks. Covers fibre channel SAN, Network Attached Storage, iSCSI and InfiniBand technologies. Contains several case studies (e.g. the example of a travel portal, protecting a critical database) Endorsed by the Storage Networking Industry Association. Written by very experienced professionals who tailored the book specifically to meet customer needs including support with supplementary material on Troppens website and

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Preface written by Tony Clark. Provides basic application information key for systems administrators, database administrators and managers who need to know about the networking aspects of their systems. As well as systems architects, network managers, information management directors and decision makers. This book also supports applications for graduate students and other relevant courses in the field. Awarded Best System Administration Book 2005 by the Linux Journal

### **SAP HANA on IBM Power Systems: High Availability and Disaster Recovery Implementation Updates**

Despite the buzz surrounding the cloud computing, only a small percentage of organizations have actually deployed this new style of IT—so far. If you're planning your long-term cloud strategy, this practical book provides insider knowledge and actionable real-world lessons regarding planning, design, operations, security, and application transformation. This book teaches business and technology managers how to transition their organization's traditional IT to cloud computing. Rather than yet another book trying to sell or convince readers on the benefits of clouds, this book provides guidance, lessons learned, and best practices on how to design, deploy, operate, and secure an enterprise cloud based on real-world experience. Author James Bond provides useful guidance and best-practice checklists based on his field experience with real customers and cloud providers. You'll view cloud

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services from the perspective of a consumer and as an owner/operator of an enterprise private or hybrid cloud, and learn valuable lessons from successful and less-than-successful organization use-case scenarios. This is the information every CIO needs in order to make the business and technical decisions to finally execute on their journey to cloud computing. Get updated trends and definitions in cloud computing, deployment models, and for building or buying cloud services Discover challenges in cloud operations and management not foreseen by early adopters Use real-world lessons to plan and build an enterprise private or hybrid cloud Learn how to assess, port, and migrate legacy applications to the cloud Identify security threats and vulnerabilities unique to the cloud Employ a cloud management system for your enterprise (private or multi-provider hybrid) cloud ecosystem Understand the challenges for becoming an IT service broker leveraging the power of the cloud

### **IBM Information Infrastructure Solutions Handbook**

The plethora of data that is created by the businesses of today is making storage a strategic investment priority for companies of all sizes. As storage takes precedence, three major initiatives emerge: Flatten and converge your network IBM takes an open, standards-based approach to implement the latest advances in the flat, converged data center network designs of today. IBM System Networking solutions enable clients to deploy a high-speed, low-latency Unified Fabric

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Architecture. Optimize and automate virtualization Advanced virtualization awareness reduces the cost and complexity of deploying physical and virtual data center infrastructure. Simplify management IBM data center networks are easy to deploy, maintain, scale, and virtualize, delivering the foundation of consolidated operations for dynamic infrastructure management. Storage is no longer an afterthought. Too much is at stake. Companies are searching for more ways to efficiently manage expanding volumes of data, and to make that data accessible throughout the enterprise. This demand is propelling the move of storage into the network. Also, the increasing complexity of managing a large numbers of storage devices and vast amounts of data is driving greater business value into software and services. With current estimates of the amount of data to be managed and made available increasing at 60 percent each year, this outlook is where a storage area network (SAN) enters the arena. SANs are the leading storage infrastructure for the global economy of today. SANs offer simplified storage management, scalability, flexibility, and availability; and improved data access, movement, and backup. Welcome to the era of Smarter Networking for Smarter Data Centers. The smarter data center with improved economics of IT can be achieved by connecting servers and storage with a high-speed and intelligent network fabric. A smarter data center that hosts IBM System Networking solutions can provide an environment that is smarter, faster, greener, open, and easy to manage. This IBM Redbooks® publication provides an introduction to the SAN and Ethernet networking, and how these networks help to achieve a smarter data center. This

book is intended for people who are not very familiar with IT, or who are just starting out in the IT world. For more information, and a deeper dive into the SAN world, you might find the following Redbooks publications especially useful to expand your SAN knowledge: Implementing a

### **IBM Power System AC922 Introduction and Technical Overview**

To meet today's complex and ever-changing business demands, you need a solid foundation of compute, storage, networking, and software resources. This system must be simple to deploy, and be able to quickly and automatically adapt to changing conditions. You also need to be able to take advantage of broad expertise and proven guidelines in systems management, applications, hardware maintenance, and more. The IBM® PureFlex® System combines no-compromise system designs along with built-in expertise and integrates them into complete, optimized solutions. At the heart of PureFlex System is the IBM Flex System® Enterprise Chassis. This fully integrated infrastructure platform supports a mix of compute, storage, and networking resources to meet the demands of your applications. The solution is easily scalable with the addition of another chassis with the required nodes. With the IBM Flex System Manager®, multiple chassis can be monitored from a single panel. The 14 node, 10U chassis delivers high-speed performance complete with integrated servers, storage, and networking. This flexible chassis is simple to deploy now, and to scale to meet your needs in the

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future. This IBM Redbooks® publication describes IBM PureFlex System and IBM Flex System available from IBM. It highlights the technology and features of the chassis, compute nodes, management features, and connectivity options. Guidance is provided about every major component, and about networking and storage connectivity. This book is intended for customers, IBM Business Partners, and IBM employees who want to know the details about the new family of products. It assumes that you have a basic understanding of blade server concepts and general IT knowledge.

### **IBM SONAS Implementation Guide**

Compares the architecture, management responsibilities, storage procedures, size, and reliability of the information storage and retrieval technologies.

### **IBM System Storage Business Continuity: Part 1 Planning Guide**

This IBM® Redpaper™ publication describes the adapter-based virtualization capabilities that are being deployed in high-end IBM POWER7+™ processor-based servers. Peripheral Component Interconnect Express (PCIe) single root I/O virtualization (SR-IOV) is a virtualization technology on IBM Power Systems servers.

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SR-IOV allows multiple logical partitions (LPARs) to share a PCIe adapter with little or no run time involvement of a hypervisor or other virtualization intermediary. SR-IOV does not replace the existing virtualization capabilities that are offered as part of the IBM PowerVM® offerings. Rather, SR-IOV compliments them with additional capabilities. This paper describes many aspects of the SR-IOV technology, including:

- A comparison of SR-IOV with standard virtualization technology
- Overall benefits of SR-IOV
- Architectural overview of SR-IOV
- Planning requirements
- SR-IOV deployment models that use standard I/O virtualization
- Configuring the adapter for dedicated or shared modes
- Tips for maintaining and troubleshooting your system
- Scenarios for configuring your system

This paper is directed to clients, IBM Business Partners, and system administrators who are involved with planning, deploying, configuring, and maintaining key virtualization technologies.

### **IBM Scale Out Network Attached Storage**

To meet today's complex and ever-changing business demands, you need a solid foundation of compute, storage, networking, and software resources. This system must be simple to deploy and be able to quickly and automatically adapt to changing conditions. You also need to be able to take advantage of broad expertise and proven guidelines in systems management, applications, industry solutions, and more. IBM® PureFlex® System combines no-compromise system designs along with built-in expertise and integrates them into complete, optimized

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scalable solutions. With IBM Flex System® Manager, multiple solution components that include compute nodes, network and storage infrastructures, storage systems, and heterogeneous virtualization environments can be managed from a single panel. This IBM Redbooks® publication introduces IBM PureFlex System and IBM Flex System and their management devices and appliances. It provides implementation guidelines for managing Linux kernel-based virtual machine (KVM), IBM PowerVM®, VMware vSphere, and Microsoft Hyper-V virtualization environments. This book is intended for the IT community of clients, IBM Business Partners, and IBM employees who are interested in planning and implementing systems management of the IBM PureFlex System.

### **Network Magazine**

Boost your Big Data IQ! Gain insight into how to govern and consume IBM's unique in-motion and at-rest Big Data analytic capabilities Big Data represents a new era of computing—an inflection point of opportunity where data in any format may be explored and utilized for breakthrough insights—whether that data is in-place, in-motion, or at-rest. IBM is uniquely positioned to help clients navigate this transformation. This book reveals how IBM is infusing open source Big Data technologies with IBM innovation that manifest in a platform capable of "changing the game." The four defining characteristics of Big Data—volume, variety, velocity, and veracity—are discussed. You'll understand how IBM is fully committed to

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Hadoop and integrating it into the enterprise. Hear about how organizations are taking inventories of their existing Big Data assets, with search capabilities that help organizations discover what they could already know, and extend their reach into new data territories for unprecedented model accuracy and discovery. In this book you will also learn not just about the technologies that make up the IBM Big Data platform, but when to leverage its purpose-built engines for analytics on data in-motion and data at-rest. And you'll gain an understanding of how and when to govern Big Data, and how IBM's industry-leading InfoSphere integration and governance portfolio helps you understand, govern, and effectively utilize Big Data. Industry use cases are also included in this practical guide.

### **IBM Technical Computing Clouds**

Monitoring of your Scale Out Network Attached Storage (SONAS) cluster resources is key to ensuring that all components are functioning at their optimum level. There are a variety of tools available to help collect valuable resource configuration, utilization, and performance information as well as capturing growth trends over time. This IBM® Redbooks® publication provides an introduction to several monitoring tools and how to use them. Scenarios for monitoring the SONAS environment using these tools are provided. The tools documented in this publication are SONAS built-in monitoring, IBM Tivoli® Storage Productivity Center, Arxview Data Center Analytics Engine, and the Galileo Suite Storage Monitoring

product. This book is written for anyone who needs to learn how to monitor their Scale Out Network Attached Storage (SONAS) resources. It is suitable for IT architects, business partners, IBM clients, storage solution integrators, and IBM sales representatives.

### **IBM Scale Out Network Attached Storage Concepts**

This IBM® Redpaper™ publication introduces and describes the IBM Elastic Storage™ Server as a scalable, high-performance data and file management solution. The solution is built on proven IBM Spectrum™ Scale technology, formerly IBM General Parallel File System (GPFS™). IBM Elastic Storage Servers can be implemented for a range of diverse requirements, providing reliability, performance, and scalability. This publication helps you to understand the solution and its architecture and helps you to plan the installation and integration of the environment. The following combination of physical and logical components are required: Hardware Operating system Storage Network Applications This paper provides guidelines for several usage and integration scenarios. Typical scenarios include Cluster Export Services (CES) integration, disaster recovery, and multicluster integration. This paper addresses the needs of technical professionals (consultants, technical support staff, IT Architects, and IT Specialists) who must deliver cost-effective cloud services and big data solutions.

## **IBM Flex System p260 and p460 Planning and Implementation Guide**

This IBM® Redbooks® publication updates Implementing High Availability and Disaster Recovery Solutions with SAP HANA on IBM Power Systems, REDP-5443 with the latest technical content that describes how to implement an SAP HANA on IBM Power Systems™ high availability (HA) and disaster recovery (DR) solution by using theoretical knowledge and sample scenarios. This book describes how all the pieces of the reference architecture work together (IBM Power Systems servers, IBM Storage servers, IBM Spectrum™ Scale, IBM PowerHA® SystemMirror® for Linux, IBM VM Recovery Manager DR for Power Systems, and Linux distributions) and demonstrates the resilience of SAP HANA with IBM Power Systems servers. This publication is for architects, brand specialists, distributors, resellers, and anyone developing and implementing SAP HANA on IBM Power Systems integration, automation, HA, and DR solutions. This publication provides documentation to transfer the how-to-skills to the technical teams, and documentation to the sales team.

## **IBM SONAS Best Practices**

To meet today's complex and ever-changing business demands, you need a solid

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foundation of compute, storage, networking, and software resources that is simple to deploy and can quickly and automatically adapt to changing conditions. You also need to be able to take advantage of broad expertise and proven preferred practices in systems management, applications, hardware maintenance, and more. The IBM® Flex System™ p260 and p460 Compute Nodes are IBM Power Systems™ servers optimized for virtualization, performance, and efficiency. The nodes support IBM AIX®, IBM i, or Linux operating environments, and are designed to run various workloads in IBM PureFlex™ System. This IBM Redbooks® publication is a comprehensive guide to IBM PureFlex System and the Power Systems compute nodes. We introduce the offerings and describe the compute nodes in detail. We then describe planning and implementation steps and go through some of the key the management features of the IBM Flex System Manager management node. This book is for customers, IBM Business Partners, and IBM technical specialists that want to understand the new offerings and to plan and implement an IBM Flex System installation that involves the Power Systems compute nodes.

### **Essentials of Application Development on IBM Cloud**

This IBM® Redpaper™ publication provides a broad understanding of a new architecture of the IBM Power System E980 (9080-M9S) server that supports IBM AIX®, IBM i, and Linux operating systems (OSes). The objective of this paper is to

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introduce the major innovative Power E980 offerings and relevant functions: The IBM POWER9™ processor, which is available at frequencies of 3.55 - 4.0 GHz. Significantly strengthened cores and larger caches. Supports up to 64 TB memory. Integrated I/O subsystem and hot-pluggable Peripheral Component Interconnect Express (PCIe) Gen4 slots, double the bandwidth of Gen3 I/O slots. Supports EXP12SX and ESP24SX external disk drawers, which have 12 Gb SAS interfaces and double the existing EXP24S drawer bandwidth. New IBM EnergyScale™ technology offers new variable processor frequency modes that provide a significant performance boost beyond the static nominal frequency. This publication is for professionals who want to acquire a better understanding of IBM Power Systems™ products. The intended audience includes the following roles: Clients Sales and marketing professionals Technical support professionals IBM Business Partners Independent software vendors (ISVs) This paper expands the current set of IBM Power Systems documentation by providing a desktop reference that offers a detailed technical description of the Power E980 server. This paper does not replace the current marketing materials and configuration tools. It is intended as an extra source of information that, together with existing sources, can be used to enhance your knowledge of IBM server solutions.

### **Harness the Power of Big Data The IBM Big Data Platform**

IBM® Scale Out Network Attached Storage (SONAS) is a scale out network-

attached storage offering that is designed to manage vast repositories of information in enterprise environments that require large capacities, high levels of performance, and high availability. SONAS provides a range of reliable, scalable storage solutions for various storage requirements. These capabilities are achieved by using network access protocols such as Network File System (NFS), Common Internet File System (CIFS), Hypertext Transfer Protocol Secure (HTTPS), File Transfer Protocol (FTP), and Secure Copy Protocol (SCP). Using built-in RAID technologies, all data is well-protected with options to add more protection through mirroring, replication, snapshots, and backup. These storage systems are also characterized by simple management interfaces that make installation, administration, and troubleshooting uncomplicated and straightforward. This IBM Redbooks® publication is the companion to IBM SONAS Best Practices, SG24-8051. It is intended for storage administrators who have ordered their SONAS solution and are ready to install, customize, and use it. It provides backup and availability scenarios information about configuration and troubleshooting. This book applies to IBM SONAS Version 1.5.5. It is useful for earlier releases of IBM SONAS as well.

### **IBM Power Systems RAID Solutions Introduction and Technical Overview**

VersaStack, an IBM and Cisco integrated infrastructure solution, combines

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computing, networking, and storage into a single integrated system. It combines the Cisco Unified Computing System™ (Cisco UCS®) Integrated Infrastructure with IBM Spectrum Virtualize™, which includes IBM FlashSystem® V9000 and IBM Storwize® storage offerings, for quick deployment and rapid time to value for the implementation of modern infrastructures. With comprehensive reference architectures that include Cisco Validated Designs (CVDs), IBM Redbooks® publications, sizing guidelines, and single-call support, the solution sets a benchmark to accelerate data center infrastructure deployment and to help manage information and resources efficiently amid business change. This IBM Redbooks Solution Guide provides an overview of the VersaStack solution that uses IBM FlashSystem V9000 as an all-flash storage layer. This VersaStack solution delivers extraordinary levels of storage virtualization performance and efficiency in a networking infrastructure, and compute capabilities that are based on the Cisco UCS. This guide explains how the IBM FlashSystem V9000 all-flash storage arrays add performance by using IBM MicroLatency®, macro efficiency, superior reliability, and software-defined storage enterprise features to the cloud computing-ready VersaStack solution. This guide is intended for individuals who want to learn more about the VersaStack integrated solution.

### **IBM Power Systems LC921 and LC922: Technical Overview and Introduction**

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To meet today's complex and ever-changing business demands, you need a solid foundation of compute, storage, networking, and software resources that is simple to deploy and can quickly and automatically adapt to changing conditions. You also need to make full use of broad expertise and proven preferred practices in systems management, applications, hardware maintenance, and more. The IBM® Flex System p270 Compute Node is an IBM Power Systems™ server that is based on the new dual-chip module POWER7+™ processor and is optimized for virtualization, performance, and efficiency. The server supports IBM AIX®, IBM i, or Linux operating environments, and is designed to run various workloads in IBM PureFlex™ System. The p270 Compute Node is a follow-on to the IBM Flex System™ p260 Compute Node. This IBM Redbooks® publication is a comprehensive guide to the p270 Compute Node. We introduce the related Flex System offerings and describe the compute node in detail. We then describe planning and implementation steps including converged networking, management, virtualization, and operating system installation. This book is for customers, IBM Business Partners, and IBM technical specialists who want to understand the new offerings and plan and implement an IBM Flex System installation that involves the Power Systems compute nodes.

### **IBM Power Systems SR-IOV: Technical Overview and Introduction**

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This IBM® Redpaper™ publication is a comprehensive guide that covers IBM Power Virtualization Performance (PowerVPTM) for IBM Power Systems™ Version 1.1.3. The objective of this paper is to introduce the features and benefits of PowerVP: Real-time monitoring Intuitive and customizable GUI Background data collection Multiple dynamic views Recording and replay Data stores Thresholds and alarms This publication is for professionals who are involved in performance and capacity planning, support, design, and deployment of IBM PowerVM® on IBM Power Systems. The intended audience includes the following roles: Clients Capacity planning managers Sales and marketing professionals IT Architects Technical support professionals IBM Business Partners independent software vendors This paper explains the current set of IBM PowerVP features and documents the installation and configuration. It includes real-life examples of use of PowerVM. It is intended to help you take advantage of the capabilities of IBM Power Systems and optimize the use of system resources.

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