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Relational databases have been predominant for many years and are used throughout various industries. The current system faces challenges related to size and variety of data thus the NoSQL databases emerged. By joining these two database models, there is room for crucial developments in the field of computer science. Bridging Relational and NoSQL Databases is an innovative source of academic content on the convergence process between databases and describes key features of the next database generation. Featuring coverage on a wide variety of topics and perspectives such

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as BASE approach, CAP theorem, and hybrid and native solutions, this publication is ideally designed for professionals and researchers interested in the features and collaboration of relational and NoSQL databases.

This IBM® Redbooks® publication documents and addresses topics to provide step-by-step customizable application and programming solutions to tune application and workloads to use IBM Power Systems™ hardware architecture. This publication explores, tests, and documents the solution to use the architectural technologies and the software solutions that are available from IBM to help solve challenging technical and business problems. This publication also demonstrates and documents that the combination of IBM high-performance computing (HPC) solutions (hardware and software) delivers

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significant value to technical computing clients who are in need of cost-effective, highly scalable, and robust solutions. First, the book provides a high-level overview of the HPC solution, including all of the components that makes the HPC cluster: IBM Power System S822LC (8335-GTB), software components, interconnect switches, and the IBM Spectrum™ Scale parallel file system. Then, the publication is divided in three parts: Part 1 focuses on the developers, Part 2 focuses on the administrators, and Part 3 focuses on the evaluators and planners of the solution. The IBM Redbooks publication is targeted toward technical professionals (consultants, technical support staff, IT Architects, and IT Specialists) who are responsible for delivering cost-effective HPC solutions that help uncover

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insights from vast amounts of client's data so they can optimize business results, product development, and scientific discoveries.

This IBM® Redpaper publication provides an update to the original description of IBM Reference Architecture for Genomics. This paper expands the reference architecture to cover all of the major vertical areas of healthcare and life sciences industries, such as genomics, imaging, and clinical and translational research. The architecture was renamed IBM Reference Architecture for High Performance Data and AI in Healthcare and Life Sciences to reflect the fact that it incorporates key building blocks for high-performance computing (HPC) and software-defined storage, and that it supports an expanding infrastructure of leading industry

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partners, platforms, and frameworks. The reference architecture defines a highly flexible, scalable, and cost-effective platform for accessing, managing, storing, sharing, integrating, and analyzing big data, which can be deployed on-premises, in the cloud, or as a hybrid of the two. IT organizations can use the reference architecture as a high-level guide for overcoming data management challenges and processing bottlenecks that are frequently encountered in personalized healthcare initiatives, and in compute-intensive and data-intensive biomedical workloads. This reference architecture also provides a framework and context for modern healthcare and life sciences institutions to adopt cutting-edge technologies, such as cognitive life sciences solutions, machine learning and deep learning, Spark for

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analytics, and cloud computing. To illustrate these points, this paper includes case studies describing how clients and IBM Business Partners alike used the reference architecture in the deployments of demanding infrastructures for precision medicine. This publication targets technical professionals (consultants, technical support staff, IT Architects, and IT Specialists) who are responsible for providing life sciences solutions and support.

This IBM® Redpaper publication provides guidance on building an enterprise-grade data lake by using IBM Spectrum® Scale and Cloudera Data Platform (CDP) Private Cloud Base for performing in-place Cloudera Hadoop or Cloudera Spark-based analytics. It also covers the benefits of the integrated solution and gives guidance about the types of

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deployment models and considerations during the implementation of these models.

Bridging Relational and NoSQL Databases

How 45 Successful Companies Used Big Data Analytics to Deliver Extraordinary Results

IBM Power System S812LC Technical Overview and Introduction

Apache Spark Implementation on IBM z/OS

***Knowledge is Power in Four Dimensions:
Models to Forecast Future Paradigms,
Forecasting Energy for Tomorrow's World
with Mathematical Modeling and Python***

Programming Driven Artificial Intelligence delivers knowledge on key infrastructure topics in both AI technology and energy. Sections lay the groundwork for tomorrow's computing functionality, starting with how to build a Business Resilience System (BRS), data warehousing, data management, and fuzzy logic. Subsequent chapters dive into the impact of energy on economic development and the environment and mathematical modeling, including energy forecasting and engineering statistics.

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Energy examples are included for application and learning opportunities. A final section deliver the most advanced content on artificial intelligence with the integration of machine learning and deep learning as a tool to forecast and make energy predictions. The reference covers many introductory programming tools, such as Python, Scikit, TensorFlow and Kera. Helps users gain fundamental knowledge in technology infrastructure, including AI, machine learning and fuzzy logic Compartmentalizes data

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knowledge into near-term and long-term forecasting models, with examples involving both renewable and non-renewable energy outcomes Advances climate resiliency and helps readers build a business resiliency system for assets

Enterprise Data Warehouse Optimization with Hadoop on IBM Power Systems Servers IBM Redbooks

This IBM® Redbooks® publication demonstrates and documents that IBM Power Systems™ high-performance computing and

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technical computing solutions deliver faster time to value with powerful solutions. Configurable into highly scalable Linux clusters, Power Systems offer extreme performance for demanding workloads such as genomics, finance, computational chemistry, oil and gas exploration, and high-performance data analytics. This book delivers a high-performance computing solution implemented on the IBM Power System S822LC. The solution delivers high application performance and throughput

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based on its built-for-big-data architecture that incorporates IBM POWER8® processors, tightly coupled Field Programmable Gate Arrays (FPGAs) and accelerators, and faster I/O by using Coherent Accelerator Processor Interface (CAPI). This solution is ideal for clients that need more processing power while simultaneously increasing workload density and reducing datacenter floor space requirements. The Power S822LC offers a modular design to scale from a single rack to hundreds, simplicity of ordering, and a strong

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innovation roadmap for graphics processing units (GPUs). This publication is targeted toward technical professionals (consultants, technical support staff, IT Architects, and IT Specialists) responsible for delivering cost effective high-performance computing (HPC) solutions that help uncover insights from their data so they can optimize business results, product development, and scientific discoveries

This IBM® Redpaper™ publication gives readers a broad understanding of IBM

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Bluemix™ cloud application development platform capabilities. Providing a platform as a service (PaaS) environment as one of its run times, along with containers and virtual machines, Bluemix uses the Cloud Foundry project as one of its open source technologies to accelerate new application development and DevOps methods. It provides optimized and flexible workloads, enables continuous availability, and simplifies delivery and manageability of an application by providing prebuilt services and hosting capabilities.

***The paper reviews the Bluemix architecture, explains how it works, describes key concepts and components, and provides an overview of Bluemix security. It also covers the various Bluemix service categories and the services within each category. This information will help anyone who is interested in exploring the potential and capabilities of Bluemix and its services. Implementing an Optimized Analytics Solution on IBM Power Systems
Big Data Optimization: Recent Developments***

and Challenges

Hortonworks Data Platform with IBM

**Spectrum Scale: Reference Guide for Building
an Integrated Solution**

**Big Data: Concepts, Methodologies, Tools,
and Applications**

IBM Software-Defined Storage Guide

This IBM® Redpaper™ publication is a comprehensive guide that covers the IBM Power System™ S812LC (8347-21C) servers that use the latest IBM POWER8® processor technology and supports the Linux operating system (OS). The objective of this paper is to introduce

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the major innovative Power S812LC offerings and their relevant functions: Powerful POWER8 processors that offer 3.32 GHz or 2.92 GHz performance with eight or ten fully activated cores Superior throughput and performance for high-value Linux workloads, such as Linux, Apache, MariaDB, and PHP (LAMP), Hadoop, Spark, or industry application Low acquisition cost through system optimization (industry-standard memory, limited configurations, limited I/O and expansion, and industry-standard warranty) Up to 112 TB of internal storage More choices through open interfaces with tightly coupled FPGAs, and coherent, tightly coupled accelerators (CAPI) Improved reliability, serviceability,

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and availability (RAS) functions IBM EnergyScale™ technology provides features such as power trending, power-saving, capping of power, and thermal measurement 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 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 S812LC computing server. This paper does not replace

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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.

Today's data analysis requires the use of statistical techniques to learn from data, highlight patterns and anomalies, predictions and professionals who know how to use them. The use of Big Data technologies not only allows us to increase processing capacity, it is also about finding those ideas that allow us to obtain the knowledge embedded in the data, as long as we have the profiles and experience to carry it out. For this reason, Analytics techniques (essentially Data Mining and Business

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Intelligence) and Big Data go hand in hand for the optimal exploitation of information. Professionals, with skills in mathematics, statistics and computer engineering, who are able to extract the maximum value from the organisation's data through Analytics, must work together with optimal Big Data infrastructures. The management and analysis of big data, structured and unstructured, applied in fields such as scientific research, health, security, social networks or media, among others, is a unique tool for companies to gain competitiveness and improve the life of citizens. This tool can only be optimised with the combined application of Analytics and Big Data techniques.

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Analytics is increasingly an integral part of day-to-day operations at today's leading businesses, and transformation is also occurring through huge growth in mobile and digital channels. Enterprise organizations are attempting to leverage analytics in new ways and transition existing analytics capabilities to respond with more flexibility while making the most efficient use of highly valuable data science skills. The recent growth and adoption of Apache Spark as an analytics framework and platform is very timely and helps meet these challenging demands. The Apache Spark environment on IBM z/OS® and Linux on IBM z Systems™ platforms allows this analytics framework to run on the same

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enterprise platform as the originating sources of data and transactions that feed it. If most of the data that will be used for Apache Spark analytics, or the most sensitive or quickly changing data is originating on z/OS, then an Apache Spark z/OS based environment will be the optimal choice for performance, security, and governance. This IBM® Redpaper™ publication explores the enterprise analytics market, use of Apache Spark on IBM z Systems™ platforms, integration between Apache Spark and other enterprise data sources, and case studies and examples of what can be achieved with Apache Spark in enterprise environments. It is of interest to data scientists, data engineers,

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enterprise architects, or anybody looking to better understand how to combine an analytics framework and platform on enterprise systems.

This IBM® Redpaper™ publication addresses IBM Patterns for Cognitive Systems topics to anyone developing, implementing, and using Cognitive Solutions on IBM Power Systems™ servers. Moreover, this publication provides documentation to transfer the knowledge to the sales and technical teams. This publication describes IBM Patterns for Cognitive Systems. Think of a pattern as a use case for a specific scenario, such as event-based real-time marketing for real-time analytics, anti-money laundering, and

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addressing data oceans by reducing the cost of Hadoop. These examples are just a few of the cognitive patterns that are now available. Patterns identify and address challenges for cognitive infrastructures. These entry points then help you understand where you are on the cognitive journey and enables IBM to demonstrate the set of solutions capabilities for each lifecycle stage. This book targets technical readers, including IT specialist, systems architects, data scientists, developers, and anyone looking for a guide about how to unleash the cognitive capabilities of IBM Power Systems by using patterns.

Early Detection of Neurological Disorders Using Machine

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Learning Systems

IBM High-Performance Computing Insights with IBM

Power System AC922 Clustered Solution

*IBM Platform Computing Solutions for High Performance
and Technical Computing Workloads*

Concepts, Methodologies, Tools, and Applications

*IBM Power Systems Bits: Understanding IBM Patterns
for Cognitive Systems*

While doctors and physicians are more than capable of detecting diseases of the brain, the most agile human mind cannot compete with the processing power of modern technology. Utilizing algorithmic systems in healthcare in this way may provide a way to treat neurological diseases before

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they happen. Early Detection of Neurological Disorders Using Machine Learning Systems provides innovative insights into implementing smart systems to detect neurological diseases at a faster rate than by normal means. The topics included in this book are artificial intelligence, data analysis, and biomedical informatics. It is designed for clinicians, doctors, neurologists, physiotherapists, neurorehabilitation specialists, scholars, academics, and students interested in topics centered on biomedical engineering, bio-electronics, medical electronics, physiology, neurosciences, life sciences, and physics.

This IBM® Redbooks® publication is a refresh of IBM Technical Computing Clouds, SG24-8144, Enhance Inbound and Outbound Marketing with a Trusted Single View of the

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Customer, SG24-8173, and IBM Platform Computing Integration Solutions, SG24-8081, with a focus on High Performance and Technical Computing on IBM Power Systems™. This book describes synergies across the IBM product portfolio by using case scenarios and showing solutions such as IBM Spectrum™ Scale (formerly GPFSTM). This book also reflects and documents the IBM Platform Computing Cloud Services as part of IBM Platform Symphony® for analytics workloads and IBM Platform LSF® (with new features, such as a Hadoop connector, a MapReduce accelerator, and dynamic cluster) for job scheduling. Both products are used to help customers schedule and analyze large amounts of data for business productivity and competitive advantages. This book is

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targeted at technical professionals (consultants, technical support staff, IT Architects, and IT Specialists) that are responsible for delivering cost-effective cloud services and big data solutions on IBM Power Systems to uncover insights among client data so that they can take actions to optimize business results, product development, and scientific discoveries.

The main objective of this book is to provide the necessary background to work with big data by introducing some novel optimization algorithms and codes capable of working in the big data setting as well as introducing some applications in big data optimization for both academics and practitioners interested, and to benefit society, industry, academia, and government. Presenting applications in a variety of industries,

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this book will be useful for the researchers aiming to analyses large scale data. Several optimization algorithms for big data including convergent parallel algorithms, limited memory bundle algorithm, diagonal bundle method, convergent parallel algorithms, network analytics, and many more have been explored in this book.

Let Hadoop For Dummies help harness the power of your data and rein in the information overload Big data has become big business, and companies and organizations of all sizes are struggling to find ways to retrieve valuable information from their massive data sets with becoming overwhelmed. Enter Hadoop and this easy-to-understand For Dummies guide. Hadoop For Dummies helps readers understand the value of big data, make a business case for

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using Hadoop, navigate the Hadoop ecosystem, and build and manage Hadoop applications and clusters. Explains the origins of Hadoop, its economic benefits, and its functionality and practical applications Helps you find your way around the Hadoop ecosystem, program MapReduce, utilize design patterns, and get your Hadoop cluster up and running quickly and easily Details how to use Hadoop applications for data mining, web analytics and personalization, large-scale text processing, data science, and problem-solving Shows you how to improve the value of your Hadoop cluster, maximize your investment in Hadoop, and avoid common pitfalls when building your Hadoop cluster From programmers challenged with building and maintaining affordable, scaleable data systems to administrators who must deal with huge volumes

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of information effectively and efficiently, this how-to has something to help you with Hadoop.

With Artificial Intelligence Integration in Energy and Other Use Cases

BIG DATA ANALYTICS. CONCEPTS AND TOOLS

IBM Reference Architecture for High Performance Data and AI in Healthcare and Life Sciences

IBM Technical Computing Clouds

High Performance Computing

This IBM® Redpaper™ publication provides guidance on building an enterprise-grade data lake by using IBM Spectrum™ Scale and Hortonworks Data Platform for

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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

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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.

Big data is currently one of the most critical emerging technologies.

Organizations around the world are looking to exploit the explosive growth of data to unlock previously hidden insights in the

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hope of creating new revenue streams, gaining operational efficiencies, and obtaining greater understanding of customer needs. It is important to think of big data and analytics together. Big data is the term used to describe the recent explosion of different types of data from disparate sources. Analytics is about examining data to derive interesting and relevant trends and patterns, which can be used to inform decisions, optimize processes, and even drive new business models. With today's deluge of data comes

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the problems of processing that data, obtaining the correct skills to manage and analyze that data, and establishing rules to govern the data's use and distribution. The big data technology stack is ever growing and sometimes confusing, even more so when we add the complexities of setting up big data environments with large up-front investments. Cloud computing seems to be a perfect vehicle for hosting big data workloads. However, working on big data in the cloud brings its own challenge of reconciling two contradictory design

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principles. Cloud computing is based on the concepts of consolidation and resource pooling, but big data systems (such as Hadoop) are built on the shared nothing principle, where each node is independent and self-sufficient. A solution architecture that can allow these mutually exclusive principles to coexist is required to truly exploit the elasticity and ease-of-use of cloud computing for big data environments. This IBM® Redpaper™ publication is aimed at chief architects, line-of-business executives, and CIOs to

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provide an understanding of the cloud-related challenges they face and give prescriptive guidance for how to realize the benefits of big data solutions quickly and cost-effectively.

The best-selling author of Big Data is back, this time with a unique and in-depth insight into how specific companies use big data. Big data is on the tip of everyone's tongue. Everyone understands its power and importance, but many fail to grasp the actionable steps and resources required to utilise it effectively. This

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book fills the knowledge gap by showing how major companies are using big data every day, from an up-close, on-the-ground perspective. From technology, media and retail, to sport teams, government agencies and financial institutions, learn the actual strategies and processes being used to learn about customers, improve manufacturing, spur innovation, improve safety and so much more. Organised for easy dip-in navigation, each chapter follows the same structure to give you the information you need quickly. For each

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company profiled, learn what data was used, what problem it solved and the processes put it place to make it practical, as well as the technical details, challenges and lessons learned from each unique scenario. Learn how predictive analytics helps Amazon, Target, John Deere and Apple understand their customers Discover how big data is behind the success of Walmart, LinkedIn, Microsoft and more Learn how big data is changing medicine, law enforcement, hospitality, fashion, science and banking

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Develop your own big data strategy by accessing additional reading materials at the end of each chapter

This IBM® Redpaper™ publication is written to assist you in locating the optimal server/workload fit within the IBM Power Systems™ L and IBM OpenPOWER LC product lines. IBM has announced several scale-out servers, and as a partner in the OpenPOWER organization, unique design characteristics that are engineered into the LC line have broadened the suite of available workloads beyond typical client

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OS hosting. This paper looks at the benefits of the Power Systems L servers and OpenPOWER LC servers, and how they are different, providing unique benefits for Enterprise workloads and use cases.

Big Data Networked Storage Solution for Hadoop

BIG DATA. SAS, IBM, ORACLE, AND MICROSOFT TOOLS

Implementing an IBM InfoSphere BigInsights Cluster using Linux on Power

IBM Power Systems L and LC Server Positioning Guide

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Apache Spark for the Enterprise: Setting the Business Free

This IBM® Redbooks® publication provides options and best practices for deploying SAS Viya 3.5 on IBM POWER9™ servers. SAS Viya is a complex set of artificial intelligence (AI) and analytics solutions that require a properly planned infrastructure to meet the needs of the data scientists, business analysts, and application developers who use Viya capabilities in their daily work activities. Regardless of the user role, the underlying infrastructure matters to ensure performance expectations and service level agreement (SLA) requirements are met or exceeded. Although the general planning process is similar for deploying SAS Viya on

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any platform, key IBM POWER9 differentiators must be considered to ensure that an optimized infrastructure deployment is achieved. This guide provides useful information that is needed during the planning, sizing, ordering, installing, configuring, and tuning phases of your SAS Viya deployment on POWER9 processor-based servers. This book addresses topics for IT architects, IT specialists, developers, sellers, and anyone who wants to implement SAS Viya 3.5 on IBM POWER9 servers. Moreover, this publication provides documentation to transfer the how-to-skills to the technical teams, and solution guidance to the sales team. This book compliments the documentation that is available in IBM Knowledge Center and aligns with the educational

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materials that are provided by the IBM Systems Software Education (SSE).

This IBM® Redbooks® publication describes the integration of IBM Platform Symphony® with IBM BigInsights™. It includes IBM Platform LSF® implementation scenarios that use IBM System x® technologies. This IBM Redbooks publication is written for consultants, technical support staff, IT architects, and IT specialists who are responsible for providing solutions and support for IBM Platform Computing solutions. This book explains how the IBM Platform Computing solutions and the IBM System x platform can help to solve customer challenges and to maximize systems throughput, capacity, and management. It examines the

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tools, utilities, documentation, and other resources that are available to help technical teams provide solutions and support for IBM Platform Computing solutions in a System x environment. In addition, this book includes a well-defined and documented deployment model within a System x environment. It provides a planned foundation for provisioning and building large scale parallel high-performance computing (HPC) applications, cluster management, analytics workloads, and grid applications. As big data becomes more ubiquitous, businesses are wondering how they can best leverage it to gain insight into their most important business questions. Using machine learning (ML) and deep learning (DL) in big data environments can identify historical patterns and build

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artificial intelligence (AI) models that can help businesses to improve customer experience, add services and offerings, identify new revenue streams or lines of business (LOBs), and optimize business or manufacturing operations. The power of AI for predictive analytics is being harnessed across all industries, so it is important that businesses familiarize themselves with all of the tools and techniques that are available for integration with their data lake environments. In this IBM® Redbooks® publication, we cover the best practices for deploying and integrating some of the best AI solutions on the market, including: IBM Watson Machine Learning Accelerator (see note for product naming) IBM Watson Studio Local IBM Power Systems™

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IBM Spectrum™ Scale IBM Data Science Experience (IBM DSX) IBM Elastic Storage™ Server Hortonworks Data Platform (HDP) Hortonworks DataFlow (HDF) H2O Driverless AI We map out all the integrations that are possible with our different AI solutions and how they can integrate with your existing or new data lake. We also walk you through some of our client use cases and show you how some of the industry leaders are using Hortonworks, IBM PowerAI, and IBM Watson Studio Local to drive decision making. We also advise you on your deployment options, when to use a GPU, and why you should use the IBM Elastic Storage Server (IBM ESS) to improve storage management. Lastly, we describe how to integrate IBM Watson Machine Learning

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Accelerator and Hortonworks with or without IBM Watson Studio Local, how to access real-time data, and security.

Note: IBM Watson Machine Learning Accelerator is the new product name for IBM PowerAI Enterprise. Note: Hortonworks merged with Cloudera in January 2019. The new company is called Cloudera. References to Hortonworks as a business entity in this publication are now referring to the merged company. Product names beginning with Hortonworks continue to be marketed and sold under their original names.

This IBM® Redbooks® publication provides topics to help the technical community take advantage of the resilience, scalability, and performance of the IBM Power Systems™ platform to implement or integrate an IBM

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Data Engine for Hadoop and Spark solution for analytics solutions to access, manage, and analyze data sets to improve business outcomes. This book documents topics to demonstrate and take advantage of the analytics strengths of the IBM POWER8® platform, the IBM analytics software portfolio, and selected third-party tools to help solve customer's data analytic workload requirements. This book describes how to plan, prepare, install, integrate, manage, and show how to use the IBM Data Engine for Hadoop and Spark solution to run analytic workloads on IBM POWER8. In addition, this publication delivers documentation to complement available IBM analytics solutions to help your data analytic needs. This publication strengthens the position

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of IBM analytics and big data solutions with a well-defined and documented deployment model within an IBM POWER8 virtualized environment so that customers have a planned foundation for security, scaling, capacity, resilience, and optimization for analytics workloads. This book is targeted at technical professionals (analytics consultants, technical support staff, IT Architects, and IT Specialists) that are responsible for delivering analytics solutions and support on IBM Power Systems.

Big Data in Practice

IBM Data Engine for Hadoop and Spark

AI and Big Data on IBM Power Systems Servers

Hadoop For Dummies

Implementing an IBM High-Performance Computing

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Solution on IBM Power System S822LC

Big Data is the processing and analysis of large amounts of data, the size of which makes it impossible to handle with conventional database and analytical tools. The proliferation of websites, image and video applications, social networks, mobile devices, apps, sensors and other modern devices capable of generating huge amounts of data have made it necessary to develop Big Data tools for their analysis. As for Big Data tools, there is a growing development. Oracle uses Exadata for these purposes, SAS uses Visual Analytics and other tools, Microsoft uses Windows Azure, IBM uses Modeler and other tools based in Hadoop. Oracle includes

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Hadoop in Oracle Big Data Appliance, Oracle Big Data Connectors and Oracle Loader for Hadoop. SAS incorporates Hadoop in its applications (SAS Base, SAS Data Integration, SAS Enterprise Guide, SAS Enterprise Miner, SAS Visual Analytics, SAS Visual Statistics and others). IBM works with Hadoop in its IBM InfoSphere BigInsights platform (BigInsights) and Microsoft incorporates Hadoop in the Windows Azure platform with its Big Data applications (HDInsight, Polybase and others).

The digital age has presented an exponential growth in the amount of data available to individuals looking to draw conclusions based on given or collected information across industries. Challenges associated

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with the analysis, security, sharing, storage, and visualization of large and complex data sets continue to plague data scientists and analysts alike as traditional data processing applications struggle to adequately manage big data. Big Data: Concepts, Methodologies, Tools, and Applications is a multi-volume compendium of research-based perspectives and solutions within the realm of large-scale and complex data sets. Taking a multidisciplinary approach, this publication presents exhaustive coverage of crucial topics in the field of big data including diverse applications, storage solutions, analysis techniques, and methods for searching and transferring large data sets, in addition to security

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issues. Emphasizing essential research in the field of data science, this publication is an ideal reference source for data analysts, IT professionals, researchers, and academics.

This IBM® Redpaper publication helps the line of business (LOB), data science, and information technology (IT) teams develop an information architecture (IA) for their enterprise artificial intelligence (AI) environment. It describes the challenges that are faced by the three roles when creating and deploying enterprise AI solutions, and how they can collaborate for best results. This publication also highlights the capabilities of the IBM Cognitive Systems and AI solutions: IBM Watson®

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Machine Learning Community Edition IBM Watson Machine Learning Accelerator (WMLA) IBM PowerAI Vision IBM Watson Machine Learning IBM Watson Studio Local IBM Video Analytics H2O Driverless AI IBM Spectrum® Scale IBM Spectrum Discover This publication examines the challenges through five different use case examples: Artificial vision Natural language processing (NLP) Planning for the future Machine learning (ML) AI teaming and collaboration This publication targets readers from LOBs, data science teams, and IT departments, and anyone that is interested in understanding how to build an IA to support enterprise AI development and deployment. Today, new business models in the marketplace

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coexist with traditional ones and their well-established IT architectures. They generate new business needs and new IT requirements that can only be satisfied by new service models and new technological approaches. These changes are reshaping traditional IT concepts. Cloud in its three main variants (Public, Hybrid, and Private) represents the major and most viable answer to those IT requirements, and software-defined infrastructure (SDI) is its major technological enabler. IBM® technology, with its rich and complete set of storage hardware and software products, supports SDI both in an open standard framework and in other vendors' environments. IBM services are able to deliver

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solutions to the customers with their extensive knowledge of the topic and the experiences gained in partnership with clients. This IBM Redpaper™ publication focuses on software-defined storage (SDS) and IBM Storage Systems product offerings for software-defined environments (SDEs). It also provides use case examples across various industries that cover different client needs, proposed solutions, and results. This paper can help you to understand current organizational capabilities and challenges, and to identify specific business objectives to be achieved by implementing an SDS solution in your enterprise.

IBM Bluemix The Cloud Platform for Creating and

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Delivering Applications

*Enterprise Data Warehouse Optimization with
Hadoop on IBM Power Systems Servers*

*POWER8 High-performance Computing Guide IBM
Power System S822LC (8335-GTB) Edition*

*IBM Reference Architecture for Genomics, Power
Systems Edition*

IBM Power Systems Enterprise AI Solutions

This IBM® Redbooks® publication addresses topics to use the virtualization strengths of the IBM POWER8® platform to solve clients' system resource utilization challenges and maximize systems' throughput and capacity. This book addresses performance tuning

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topics that will help answer clients' complex analytic workload requirements, help maximize systems' resources, and provide expert-level documentation to transfer the how-to-skills to the worldwide teams. This book strengthens the position of IBM Analytics and Big Data solutions with a well-defined and documented deployment model within a POWER8 virtualized environment, offering clients a planned foundation for security, scaling, capacity, resilience, and optimization for analytics workloads. This book is targeted toward technical professionals (analytics consultants, technical support staff, IT Architects, and IT Specialists) who

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are responsible for providing analytics solutions and support on IBM Power Systems™.

This book constitutes revised selected papers from 7 workshops that were held in conjunction with the ISC High Performance 2016 conference in Frankfurt, Germany, in June 2016. The 45 papers presented in this volume were carefully reviewed and selected for inclusion in this book. They stem from the following workshops: Workshop on Exascale Multi/Many Core Computing Systems, E-MuCoCoS; Second International Workshop on Communication Architectures at Extreme Scale, ExaComm; HPC I/O

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in the Data Center Workshop, HPC-IODC; International Workshop on OpenPOWER for HPC, IWOPH; Workshop on the Application Performance on Intel Xeon Phi – Being Prepared for KNL and Beyond, IXPUG; Workshop on Performance and Scalability of Storage Systems, WOPSSS; and International Workshop on Performance Portable Programming Models for Accelerators, P3MA.

The term big data refers to extremely large sets of data that are analyzed to reveal insights, such as patterns, trends, and associations. The algorithms that analyze this data to provide these insights must extract value

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from a wide range of data sources, including business data and live, streaming, social media data. However, the real value of these insights comes from their timeliness. Rapid delivery of insights enables anyone (not only data scientists) to make effective decisions, applying deep intelligence to every enterprise application. Apache Spark is an integrated analytics framework and runtime to accelerate and simplify algorithm development, deployment, and realization of business insight from analytics. Apache Spark on IBM® z/OS® puts the open source engine, augmented with unique differentiated features, built specifically

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for data science, where big data resides. This IBM Redbooks® publication describes the installation and configuration of IBM z/OS Platform for Apache Spark for field teams and clients. Additionally, it includes examples of business analytics scenarios.

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

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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.

Cloudera Data Platform Private Cloud Base with IBM Spectrum Scale

Harness the Power of Big Data The IBM Big Data

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Platform

IBM Power Systems for SAS Viya 3.5 Deployment Guide

Knowledge is Power in Four Dimensions: Models to Forecast Future Paradigm

IBM Software Defined Infrastructure for Big Data Analytics Workloads

This IBM® Redbooks® publication documents and addresses topics to set up a complete infrastructure environment and tune the applications to use an IBM POWER9™ hardware architecture with the technical

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computing software stack. This publication is driven by a CORAL project solution. It explores, tests, and documents how to implement an IBM High-Performance Computing (HPC) solution on a POWER9 processor-based system by using IBM technical innovations to help solve challenging scientific, technical, and business problems. This book documents the HPC clustering solution with InfiniBand on IBM Power Systems™ AC922 8335-GTH and 8335-GTX servers with NVIDIA Tesla V100 SXM2 graphics

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processing units (GPUs) with NVLink, software components, and the IBM Spectrum™ Scale parallel file system. This solution includes recommendations about the components that are used to provide a cohesive clustering environment that includes job scheduling, parallel application tools, scalable file systems, administration tools, and a high-speed interconnect. This book is divided into three parts: Part 1 focuses on the planners of the solution, Part 2 focuses on the administrators, and Part 3 focuses on the

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developers. This book targets technical professionals (consultants, technical support staff, IT architects, and IT specialists) who are responsible for delivering cost-effective HPC solutions that help uncover insights among clients' data so that they can act to optimize business results, product development, and scientific discoveries.

This IBM® Redbooks® publication demonstrates and documents how to implement and manage an IBM PowerLinux™ cluster for big data focusing on hardware

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management, operating systems provisioning, application provisioning, cluster readiness check, hardware, operating system, IBM InfoSphere® BigInsights™, IBM Platform Symphony®, IBM Spectrum™ Scale (formerly IBM GPFSTM), applications monitoring, and performance tuning. This publication shows that IBM PowerLinux clustering solutions (hardware and software) deliver significant value to clients that need cost-effective, highly scalable, and robust solutions for big data and analytics workloads. This book

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documents and addresses topics on how to use IBM Platform Cluster Manager to manage PowerLinux BigData data clusters through IBM InfoSphere BigInsights, Spectrum Scale, and Platform Symphony. This book documents how to set up and manage a big data cluster on PowerLinux servers to customize application and programming solutions, and to tune applications to use IBM hardware architectures. This document uses the architectural technologies and the software solutions that are available from IBM to help

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solve challenging technical and business problems. This book is targeted at technical professionals (consultants, technical support staff, IT Architects, and IT Specialists) that are responsible for delivering cost-effective Linux on IBM Power Systems™ solutions that help uncover insights among client's data so they can act to optimize business results, product development, and scientific discoveries.

Data warehouses were developed for many good reasons, such as providing quick query and reporting for business operations, and

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business performance. However, over the years, due to the explosion of applications and data volume, many existing data warehouses have become difficult to manage. Extract, Transform, and Load (ETL) processes are taking longer, missing their allocated batch windows. In addition, data types that are required for business analysis have expanded from structured data to unstructured data. The Apache open source Hadoop platform provides a great alternative for solving these problems. IBM® has committed to open

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source since the early years of open Linux. IBM and Hortonworks together are committed to Apache open source software more than any other company. IBM Power Systems™ servers are built with open technologies and are designed for mission-critical data applications. Power Systems servers use technology from the OpenPOWER Foundation, an open technology infrastructure that uses the IBM POWER® architecture to help meet the evolving needs of big data applications. The combination of Power Systems with

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Hortonworks Data Platform (HDP) provides users with a highly efficient platform that provides leadership performance for big data workloads such as Hadoop and Spark. This IBM Redpaper™ publication provides details about Enterprise Data Warehouse (EDW) optimization with Hadoop on Power Systems. Many people know Power Systems from the IBM AIX® platform, but might not be familiar with IBM PowerLinux™, so part of this paper provides a Power Systems overview. A quick introduction to Hadoop is provided for those

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not familiar with the topic. Details of HDP on Power Reference architecture are included that will help both software architects and infrastructure architects understand the design. In the optimization chapter, we describe various topics: traditional EDW offload, sizing guidelines, performance tuning, IBM Elastic Storage™ Server (ESS) for data-intensive workload, IBM Big SQL as the common structured query language (SQL) engine for Hadoop platform, and tools that are available on Power Systems that are related

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to EDW optimization. We also dedicate some pages to the analytics components (IBM Data Science Experience (IBM DSX) and IBM Spectrum™ Conductor for Spark workload) for the Hadoop infrastructure.

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

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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 Hadoop and integrating it into the enterprise. Hear about how organizations are taking

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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

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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.

Building Big Data and Analytics Solutions in the Cloud

Performance and Capacity Implications for Big Data

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IODC, IXPUG, IWOPH, P³MA, VHPC, WOPSSS,
Frankfurt, Germany, June 19-23, 2016,
Revised Selected Papers

This IBM® Redbooks® publication documents how IBM Platform Computing, with its IBM Platform Symphony® MapReduce framework, IBM Spectrum Scale (based Upon IBM GPFSTM), IBM Platform LSF®, the Advanced Service Controller for Platform Symphony are work together as an infrastructure to manage not just Hadoop-related offerings, but many popular industry offerings such as Apache Spark, Storm, MongoDB, Cassandra, and so on. It describes the different ways to run Hadoop in a big data environment, and demonstrates how IBM

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Platform Computing solutions, such as Platform Symphony and Platform LSF with its MapReduce Accelerator, can help performance and agility to run Hadoop on distributed workload managers offered by IBM. This information is for technical professionals (consultants, technical support staff, IT architects, and IT specialists) who are responsible for delivering cost-effective cloud services and big data solutions on IBM Power Systems™ to help uncover insights among client's data so they can optimize product development and business results.

Big data solutions enable us to change how we do business by exploiting previously unused sources of information in ways that were not possible just a few

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years ago. In IBM® Smarter Planet® terms, big data helps us to change the way that the world works. The purpose of this IBM Redpaper™ publication is to consider the performance and capacity implications of big data solutions, which must be taken into account for them to be viable. This paper describes the benefits that big data approaches can provide. We then cover performance and capacity considerations for creating big data solutions. We conclude with what this means for big data solutions, both now and in the future. Intended readers for this paper include decision-makers, consultants, and IT architects.

This IBM® Redpaper™ provides a reference architecture, based on Apache Hadoop, to help

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businesses gain control over their data, meet tight service level agreements (SLAs) around their data applications, and turn data-driven insight into effective action. Big Data Networked Storage Solution for Hadoop delivers the capabilities for ingesting, storing, and managing large data sets with high reliability. IBM InfoSphere® Big Insights™ provides an innovative analytics platform that processes and analyzes all types of data to turn large complex data into insight. IBM InfoSphere BigInsights brings the power of Hadoop to the enterprise. With built-in analytics, extensive integration capabilities, and the reliability, security and support that you require, IBM can help put your big data to work for you. This IBM Redpaper publication provides

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basic guidelines and best practices for how to size and configure Big Data Networked Storage Solution for Hadoop.

This IBM® Redbooks® publication introduces the IBM Reference Architecture for Genomics, IBM Power Systems™ edition on IBM POWER8®. It addresses topics such as why you would implement Life Sciences workloads on IBM POWER8, and shows how to use such solution to run Life Sciences workloads using IBM Platform™ Computing software to help set up the workloads. It also provides technical content to introduce the IBM POWER8 clustered solution for Life Sciences workloads. This book customizes and tests Life Sciences workloads with a combination of an IBM Platform

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Computing software solution stack, Open Stack, and third party applications. All of these applications use IBM POWER8, and IBM Spectrum Scale™ for a high performance file system. This book helps strengthen IBM Life Sciences solutions on IBM POWER8 with a well-defined and documented deployment model within an IBM Platform Computing and an IBM POWER8 clustered environment. This system provides clients in need of a modular, cost-effective, and robust solution with a planned foundation for future growth. This book highlights IBM POWER8 as a flexible infrastructure for clients looking to deploy life sciences workloads, and at the same time reduce capital expenditures, operational expenditures, and optimization of resources. This book

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helps answer clients' workload challenges in particular with Life Sciences applications, and provides expert-level documentation and how-to-skills to worldwide teams that provide Life Sciences solutions and support to give a broad understanding of a new architecture.