POWER TO THE NEXT GENERATION WORKLOAD

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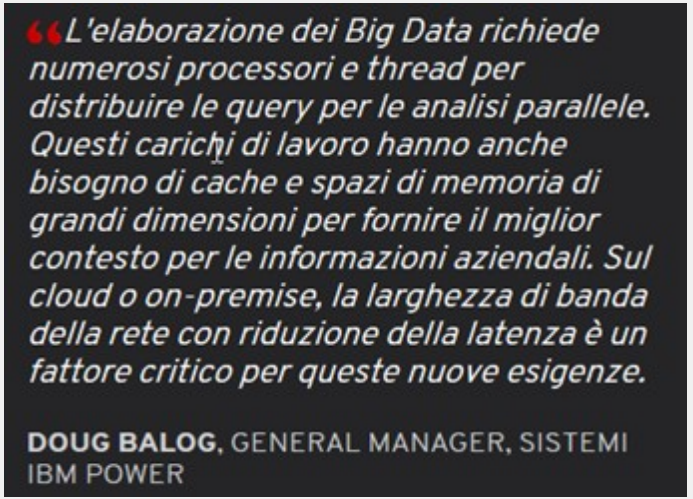
#RedHatOSD

IBM e Red Hat: una partnership strategica



Una roadmap aperta focalizzata sull'innovazione

https://www.redhat.com/it/partners/strategic-alliance/red-hat-and-ibm

AGENDA

IBM e Open source

Il consorzio OpenPOWER

Soluzioni per la piattaforma Power

Ma... cosa è il Power?

IBM e Open Source

IBM è tra i maggiori contributori alle comunità open

- Nel 1999, solo 5 persone IBM erano coinvolte nei progetti Linux e Apache
- Oggi oltre 50.000 persone IBM contribuiscono a oltre 150 organizzazioni open:
  Apache, Eclipse, OpenStack, Docker, Hadoop…

IBM partecipa all'ODPi

Importante contribuzione agli standard per lo sviluppo di soluzioni di big data

IBM membro Platinum di OpenStack

Un continuo contributo di risorse e investimenti significativi per il successo della community e del codice

Prodotti di punta IBM rilasciati in 'Versione Community'

Esempio: Application server, Enterprise bus, MQ per la messaggistica…

Rilascio dei progetti per processore POWER

Per migliorare le componenti tecnologiche e aumentare la diffusione della piattaforma

https://www.ibm.com/middleware/it-it/knowledge/application-platform/open-source.html

Il consorzio OpenPOWER

Consorzio OpenPOWER

Soci Fondatori

Agosto 2013

http://openpowerfoundation.org/

Consorzio OpenPOWER: anche Red Hat nel CdA

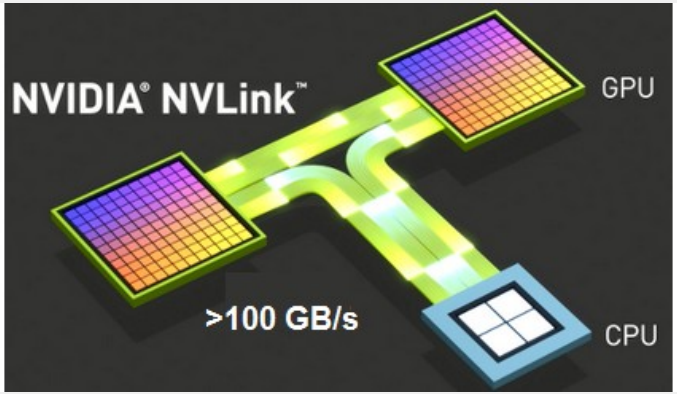
https://openpowerfoundation.org/membership/current-members/

320+
Members

31
Countries

60+
ISVs

Risultati Tangibili: tecnologia Nvlink

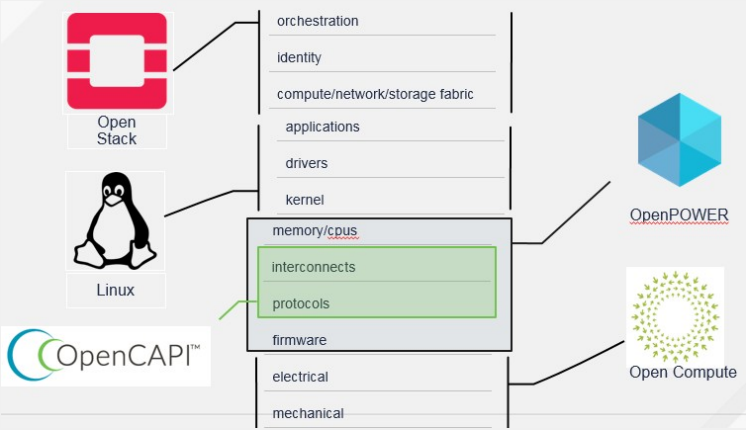


The journey that started four years ago, when IBM partnered with NVIDIA to embed a high-speed connection, NVLink, between the IBM POWER8 CPU and the NVIDIA Tesla P100 GPU accelerator, has reached its first major milestone.

This platform resolves one of GPU computing developers' and users' fundamental pain points: keeping massively parallel GPUs fed with data.

https://www.ibm.com/blogs/systems/ibm-nvidia-present-nvlink-server-youve-waiting

Risultati Tangibili: tecnologia OpenCAPI



Ottobre 2016: nasce il Consorzio OpenCAPI
Con AMD, Google, IBM, Mellanox Technologies, Micron

Bus Interface ad alte performance, coerente con standard Open

OBIETTIVO:
Superare i colli di bottiglia degli attuali bus
Facilitare i carichi accelerate con uso intenso di memoria

http://opencapi.org/

Risultati Tangibili: progetto Zaius (a cura di Google e IBM)

Introducing Zaius, Google and Rackspace's open server running IBM POWER9

Google's data center has IBM inside

Articolo di Forbes

Why, and for what, is Google using POWER9 processors? Google found that the performance of its web search algorithm, the heart and soul of the company, scaled well with both the number of cores and the number of threads available to it.
IBM's POWER9 processor is a many-core, many-thread beast.
POWER architecture's biggest advantage has always been in its acceleration capabilities

Risultati Tangibili: il progetto **D.A.V.I.D.E.** di CINECA

http://www.hpc.cineca.it/content/davide

OpenPOWER READY

D.A.V.I.D.E. entered the TOP500 and GREEN500 list in June 2017
Prodotto sviluppato dal Consorzio

D.A.V.I.D.E.: (Development of an Added Value Infrastructure Designed in Europe) reppresents the third generation of the European Prace Pre-Commercial Procurement (PCP) project to develop a Whole-System Design for Energy Efficient HPC. It is the energy-aware, **Peta flops Class High Performance Cluster** based on OpenPOWER servers and featuring liquid cooling and an innovative technology for monitoring and capping the power consumption, developed by E4 Computer Engineering and installed at CINECA. D.A.V.I.D.E. The system entered into production in January 2018.

Risultati Tangibili: il progetto **Summit** e **Sierra** del D.O.E. e IBM

https://www.tomshw.it/summit-nuovo-supercomputer-spazza-via-concorrenza-94896

+ Potenza
- Consumo di energia

potenza di picco = 200 petaflop

- 4608 nodi, ciascuno con due CPU Power9 e sei GPU Nvidia Tesla V100
- Collegati con rete Mellanox dual-rail EDR InfiniBand
- Per da offrire 200 Gbps verso ogni server

Summit sarà usato dai ricercatori per simulazioni nell'ambito della fusione, delle fonti di energia alternative, nella scienza dei materiali, sugli studi climatici, sulla chimica…

SIERRA – 27 Ottbre 2017 - **Lawrence Livermore National Laboratory** (**LLNL**)

http://uk.businessinsider.com/lawrence-livermore-labs-turns-on-sierra-supercomputer-photos-2018-10?r=US&IR=T

4,320 nodi con GPU Nvidia usati tra le altre cose per trattamenti del cancro e dei trauma cranici

e... qualcosa che sia più vicino a noi?

Il mondo accademico

Politecnico di Milano

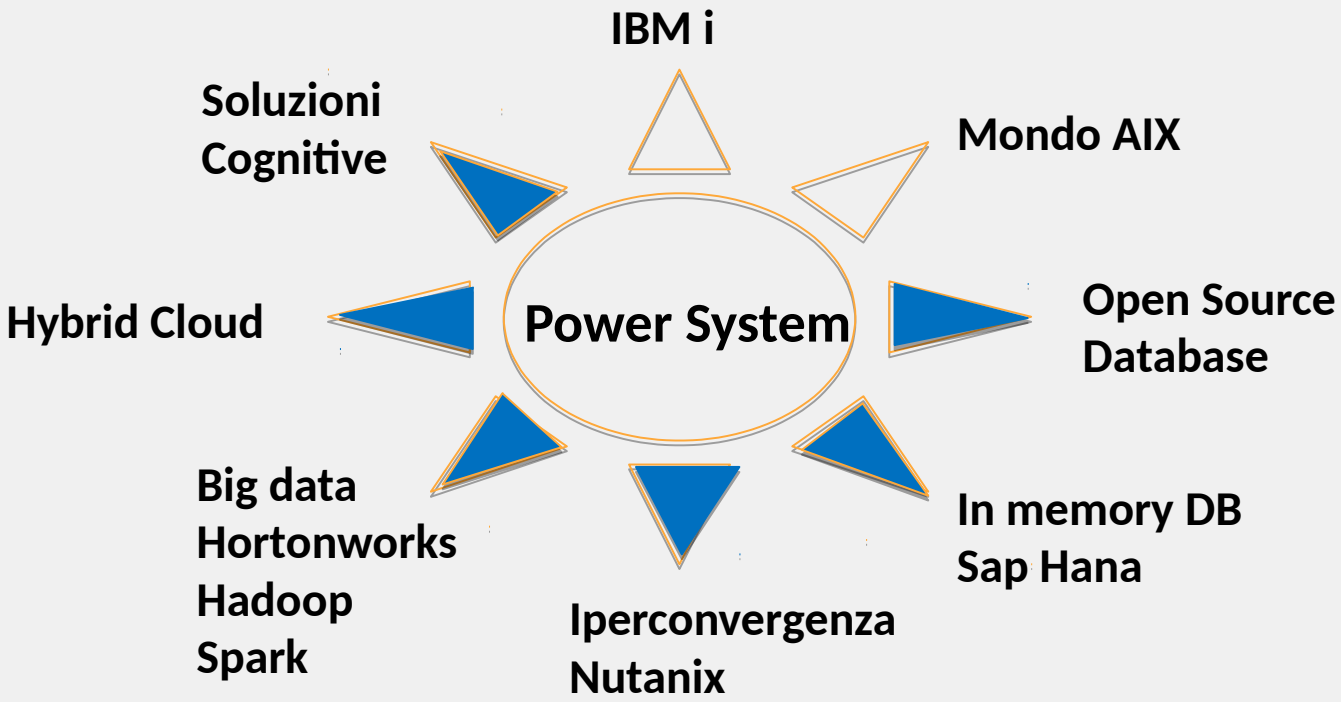
- Tecnologia Power per soluzione di big data con Hortonwork – Hadoop - Spark
- Centro per l'innovazione dedicato ai big data Scopo accademico –
- Preparae i nuovi professionisti
- Progetti di ricerca con entità esterne

INAF - Istituto Nazionale di Astrofisica

- Tecnologia POWER per analisi complete in tempo reale dei raggi Gamma su cui si concentra il CTA (complesso di 100 telescopi)
- In caso di problemi deve dare segnalazioni immediate
- OpenPOWER membership

Soluzioni per la Piattaforma Power

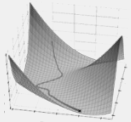
Il poliedrico mondo del Power



IBM PowerAI - Soluzioni Cognitive

https://www.ibm.com/it-infrastructure/power/accelerated-computing

Open-Source AI Offering
Ease of Use & Performance



Developer Ease-of-Use Tools

Open Source Frameworks: Supported Distribution

TensorFlow™ Caffe Chainer theano IBM Caffe torch NVIDIA Caffe

Faster Training via
HW & SW Performance Optimization

AC922 System
Designed for the AI Era

4x	Threads per core vs x86
2.6x	More RAM possible vs. x86
9.5x	Up to 9.5x more I/O bandwidth than x86
1st	CPU to deliver PCIe gen 4

Casi d’uso: applicazioni in ogni settore d’industria

Automotive and Transportation	Broadcast, Media and Entertainment	Consumer Web, Mobile, Retail	Security and Public Safety	Medicine and Biology
• Autonomous driving: • Pedestrian detection • Accident avoidance	• Captioning • Search • Recommendations • Real time translation	• Image tagging • Speech recognition • Natural language • Sentiment analysis	• Video Surveillance • Image analysis • Facial recognition and detection	• Drug discovery • Diagnostic assistance • Cancer cell detection
Auto, trucking, heavy equipment, Tier 1 suppliers (Hyundai, Toyota, Komatsu, General Motors, Volvo)	Consumer facing companies with large streaming of existing media, or real time content	Hyperscale web companies, large retail (Google photos, Twitter, Woolworths, Aeon)	Local and national police, public and private safety/ security (ADT, IViz, Pinkerton, Sentry)	Pharmaceutical, Medical equipment, Diagnostic labs (Takeda, Asian Pharma, Pfizer)

H2O.ai

https://www.ibm.com/blogs/systems/ibm-and-h2o-ai-machine-learning-ibm-power-systems/

I dati al centro delle applicazioni

https://developer.ibm.com/linuxonpower/open-source-pkgs/

Vantaggi

Prestazioni elevate

Price/Performance concorrenziale

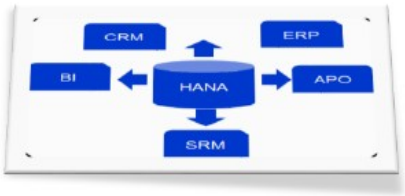
Opzione di Supporto IBM

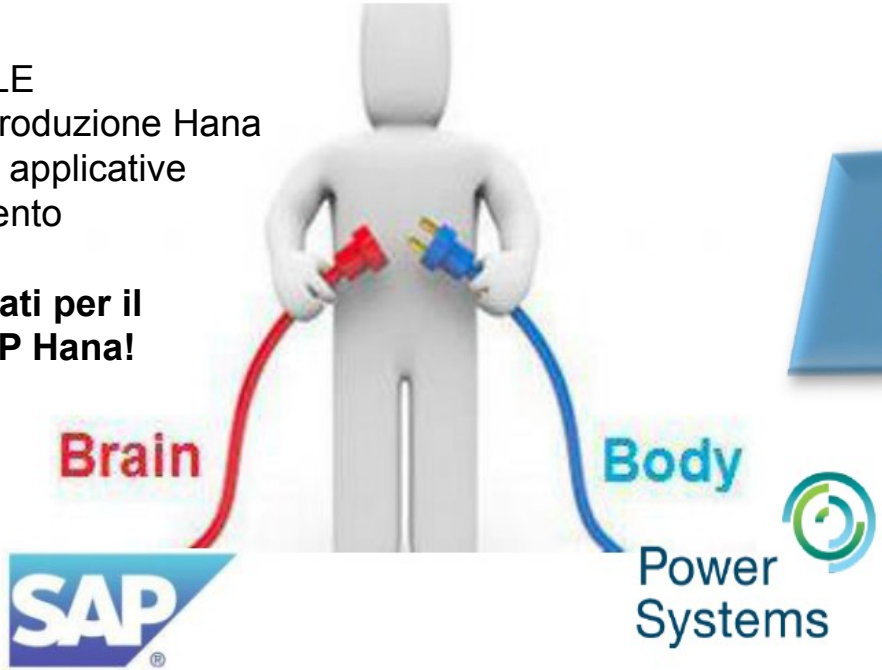
Nessun vincolo con software proprietari

Infrastruttura Power per SAP Hana

- TDI
- Da SAP HANA 2.0 in LE
- Fino a 8 partizioni di produzione Hana
- Tutte le altre partizioni applicative
- Fattore di consolidamento

Server specifici ottimizzati per il database in-memory SAP Hana!



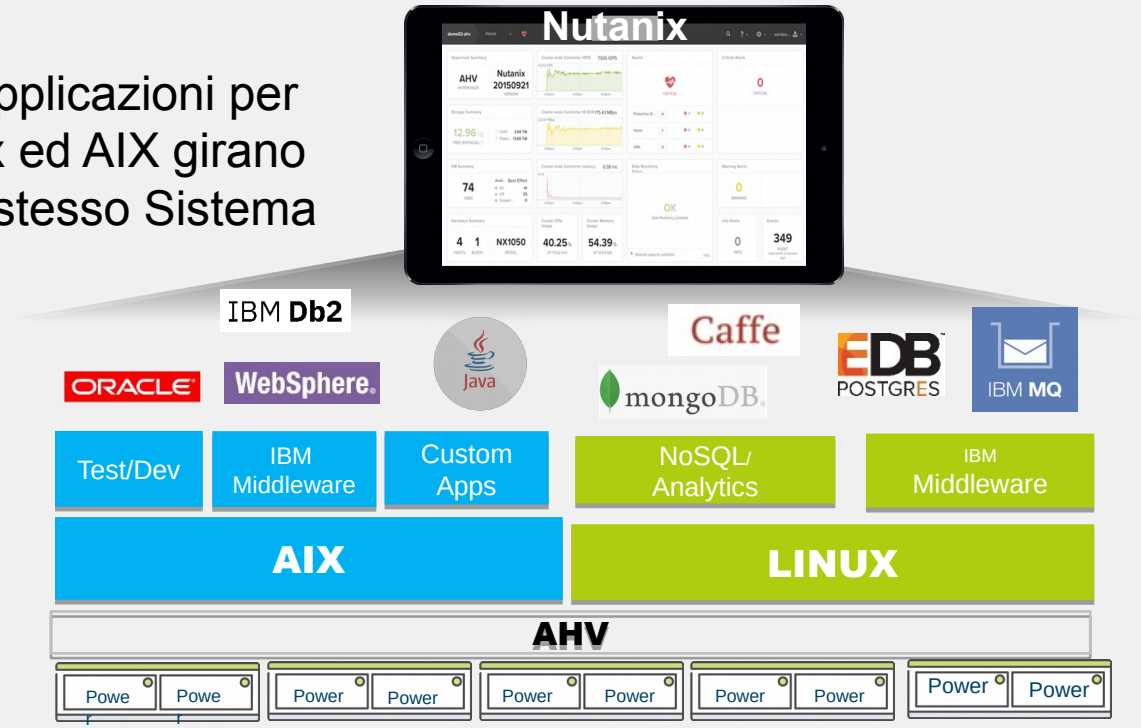


Resilient
Performant
Flexible

redhat
Linux

Soluzioni di iperconvergenza: Nutanix on Power

Le applicazioni per Linux ed AIX girano sullo stesso Sistema



con la stessa operatività di sempre

Prism

Nutanix Acropolis

Price/perfomance concorrenziale

IBM Cloud Private Basics

Built with open standards

docker	kubernetes	HELM	Terraform
Executable package of software that includes everything needed to run it	Automate deployment, scaling, and management of containerized applications	Define, install, and upgrade Kubernetes applications	Infrastructure as code to provision public cloud and on-premises environments

Runs on existing IaaS:

System Z

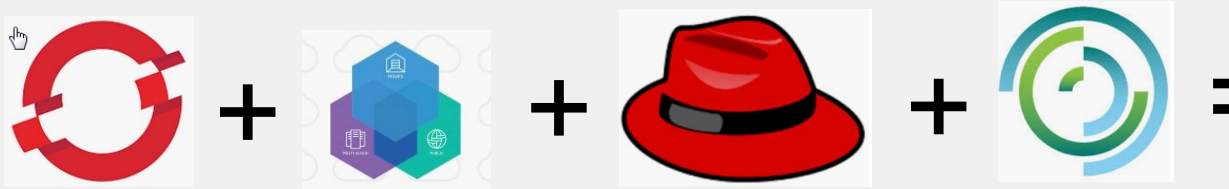
IBM Spectrum

Dell, Cisco, NetApp, Lenovo, …

Sinergia tra OpenShift e IBM Cloud Private (ICP)

Accordo con OpenShift

- Benefici nell'adozione combinata delle due tecnologie
- Entrambe utilizzabili per il cloud pubblico e privato
- Avere una piattaforma integrata per app dockerizzate
- Il middleware IBM in versione docker certificata per OpenShift
- Massimizzare gli investimenti teconologici già fatti



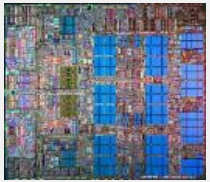
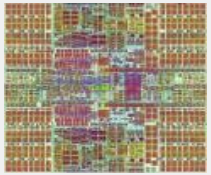
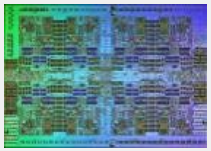
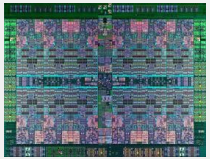
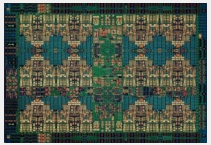
- Docker
- Infrastructure integration
- Multi-cloud management
- Innovation
- modernization

https://newsroom.ibm.com/2018-05-08-IBM-and-Red-Hat-Join-Forces-to-Accelerate-Hybrid-Cloud-Adoption

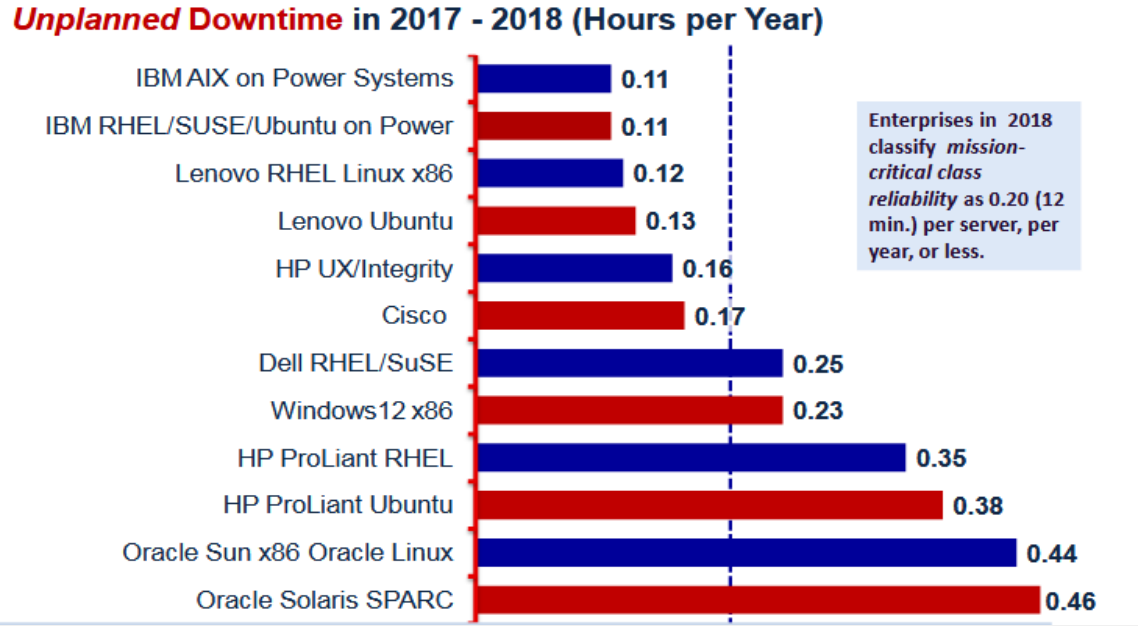
Ma... cos’è il Power?

Power - Continuous System Innovation

POWER9

2004	2007	2010	2014	2017	2020
					
POWER5/5+ 130/90 nm	**POWER6/6+ 65/65 nm**	**POWER7/7+ 45/32 nm**	**POWER8 22 nm**	**POWER9 14 nm**	**POWER10 10 nm**
• 64 cores • 4TB memory • Micro-partitions • Virtual I/O • Unified POWER virtualization • 2-way SMT • On-chip memory controller	• 8-core chips • 8TB memory • Larger L2 • Up to 5.0GHz • On-chip L3 controller • Dynamic CPU sparing • LPAR mobility • Storage keys	• 256 cores • 16TB memory • 8-core chips • 80 MB on-chip eDRAM L3 cache • 4-way SMT • Enterprise pools • Hypervisor memory mirror • Spare DRAMs	• 12-core chips • 8-way SMT • CAPI • Transactional memory • Multi-path interconnect • PCIe Gen3 On-chip controller	• 12 / 24 core chips • Slim or Fused core • 4 / 8-way SMT • CAPI 2.0 • NVlink 2.0 • 10MB L3 cache per core • DDR4 RAM • 25 GB/s interconnect • PCIe Gen4 On-chip	• ..... • ..... • .....

Ranked Number 1 in every major reliability category by ITIC



When data intensive workloads are the bottom line

Built-in PowerVM virtualization, IBM POWER9-based Power Systems are cloud-ready, enabling you to deploy the right cloud environment to meet your needs.

Enterprise cloud-ready

Power Systems easily integrate into your organization's private or hybrid cloud strategy to handle flexible consumption models and changing customer needs.

Number 1 in reliability

Ranked #1 in every major reliability category by ITIC, IBM Power Systems deliver the most reliable on-premises infrastructure to meet around-the-clock customer demands.

Industry-leading value and performance

With Power Systems, clients can take advantage of superior core performance and memory bandwidth to deliver both performance and price-performance advantages.

IBM POWER9 Family

When data-intensive workloads are the bottom line

Mission Critical Data Intensive Workloads for Private Clouds			Big Data Workloads	Enterprise AI Workloads
Entry	Midsize	Enterprise		
S922/S914/S924 H922/H924/L922	E950/H950	E980/H980	LC922/LC921	AC922

GRAZIE PER L'ATTENZIONE

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IBM Business Development Power Systems

#RedHatOSD