Power Systems
Open Innovation
Revolutionizing how IT is created and consumed

Nicola Mistretta
Power Systems Executive
Latin America
IBM has a history of industry-leading collaboration on open technology

15+ Years of Collaboration on Open Source


400+ software products

500 patents donated

600+ developers
Power Systems delivering on the promise of open innovation

USD1 billion
Linux on Power investment

5 Power Systems
Linux Centers

Power development cloud

IBM Watson
OpenPOWER Foundation
SoftLayer Integration
Red Hat technologies
Currently part of IBM’s solutions

- Offered in zCloud
- Embedded as “KVM” in:
  - IBM SmartCloud
  - zBX (x86 Blades virtualization)
  - PureFlex Systems
- Embedded in Netezza
- IBM’s Watson Cluster
  - Running on Power Systems
Target workloads for Linux on Power Systems

**Virtualized Application Infrastructure**
Java, PHP, web, networking

**Analytics & Research**
Business intelligence, structured & unstructured data, predictive analytics, HPC

**Data Services**
Database, enterprise content management

**Business Applications**
Mobile data access, ERP, cloud delivery, application development

**Workload Requirements**

- Virtualized Application Infrastructure
  - Highly threaded
  - Throughput oriented
  - Scale out capable
  - Economic efficiency

- Analytics & Research
  - Compute intensive
  - High memory bandwidth
  - Floating point
  - High I/O rates

- Data Services
  - Handle peak workloads
  - Scalability
  - High quality of service
  - Resiliency and security

- Business Applications
  - High quality of service
  - Scalability
  - Flexible infrastructure
  - Large memory footprint
Scale out as your business grows with Linux on Power Systems

**2X**
Performance vs x86

**58%**
Lower costs of acquisition

**66%**
Fewer systems

**Speed & Agility**
to capture value from new Linux workloads

**Economic Advantages**
that scale to meet business needs

**Efficiency**
to minimize infrastructure overhead

The best scale-out systems in the industry

Source: Capacity based on IBM Sizing of typical SPECint_rate landscape and 3rd party analysis of system utilization. Pricing from [www.hp.com](http://www.hp.com).

This is an IBM sizing designed to replicate a typical IBM customer workload used in the marketplace. The results are calculated and not an actual customer environment. IBM’s internal workload studies are not benchmark applications, nor are they based on any benchmark standard. As such, customer applications, differences in the stack deployed, and other systems variations or conditions may produce different results and may vary based on actual configuration, applications, specific queries and other variables in a production environment. Prices, where applicable, are based on published US list prices for both IBM and competitor.
Only Power Systems servers can scale out or scale up

Scale out or scale up with Power Systems

- Power Scale-out Systems
- Power Enterprise Systems

Power Enterprise Systems

- Heritage of high utilization, performance and scalability
- Designed for the most mission-critical applications
- Delivering economic benefits for workload consolidation

Take advantage of these capabilities today

Power Integrated Facility for Linux (IFL)
IBM Power Enterprise System Pools
IBM Capacity on Demand
Fostering open innovation for cloud based applications with Linux and Power Systems

Moving Linux apps to Power has never been easier

Well-written Java applications written in scripting or interpretive languages will run as is¹

Most x86/Linux applications written in C/C++ will require no source code change, only a recompile²

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1. Interpretive languages include PHP, Python, Perl, Ruby, Java, etc. Assumes 8 hours of dedicated time and prior experience with the application code and its dependencies (e.g. language, libraries, web application, database) and that dependencies already ported and installed. Assumes no platform or device specific dependencies.

2. Includes C/C++ and other compiled languages. Assumes 16 hours of dedicated time and prior experience with the application code and its dependencies (e.g. language, libraries, web application, database) and that dependencies already ported and installed. Assumes no platform or device specific dependencies.
A new generation of **IBM Power Systems** optimized for scale-out data and cloud infrastructures

**Linux-only systems** offer better economics for Linux deployments

**PowerKVM** simplifies management of heterogeneous data centers
New Power Scale-out systems built with open innovation to put data to work

**Power S822L**
- 1 or 2 sockets
- 10 or 12 cores/socket
- Up to 1 TB of Memory

**Power S824 or Power S814**
- 1 or 2 sockets
- 6, 8, 10 or 12 cores/socket
- Up to 1 TB of Memory

**Designed for Big Data**

**Superior Cloud Economics**

**Open Innovation Platform**
Intel: Reduce HW infrastructure in a virtualized environment but increase per-core SW costs...

POWER8: Reduce HW infrastructure EVEN MORE and REDUCE per-core SW costs up to 54%

Current Configuration
- 100 2-socket x86 servers
- Xeon X5690 processor
- 12 cores per server, 2 threads per core
- 3.46 GHz
- 1200 total cores
- VMware

1.5X increased throughput

Per-core SW Costs INCREASE 34%!!!

POWER8 Platform (2014)
- 23 2-socket POWER8 servers
- POWER8 processor
- 24 cores per server, 8 threads per core
- 3.0 GHz
- 552 total cores

Per-core SW Costs DECREASE up to 54%!!!

POWER8 DELIVERS EQUAL CAPACITY with
1/3 of the Servers (LOWER MANAGEMENT COSTS)
1/3 of the Cores (LOWER SW COSTS)
1/3 of the Space (LOWER INFRASTRUCTURE COSTS)
ALL for <50% of the x86 HW TCA

New x86 Platform (2014)
- 69 2-socket servers
- Xeon E5-2697 v2 processor
- 24 cores per server, 2 threads per core
- 2.8 GHz
- 1656 total cores
- VMware

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Power Systems 2014 ISV Linux ecosystem

- 50+ New Linux solutions for targeted segments
- 800 ISVs with over 1,500 applications

- ISV partners that bring a broad community of new developers
  - Ex: 9 New Linux ISVs bring along >100,000 Developers

- Linux solutions compliment industry offerings
- Zato’s healthcare analytics solution leverages existing patient data from EPIC and Cerner

AIX

Linux Based Analytics

New Patient Insights

Oracle 10g (Client Library)
The OpenPOWER Foundation creates a pipeline of continued innovation and extends POWER8 capabilities

The goal of the OpenPOWER Foundation is to create an open ecosystem, using the POWER Architecture to share expertise, investment, and server-class intellectual property to serve the evolving needs of customers.

- Opening the architecture to give the industry the ability to innovate across the full hardware and software stack
- Driving an expansion of enterprise-class hardware and software stack for the data center
- Building a complete ecosystem to provide customers with the flexibility to build servers best suited to the Power architecture
The OpenPOWER Foundation: Open & Collaborative Innovation Growing Fast

- System/Software/Services
- I/O, Storage, Acceleration
- Boards/Systems
- Chip/SOC

http://openpowerfoundation.org/membership/current-members/
This Google Motherboard Means Trouble for Intel

Google's Gordon MacKean with IBM POWER8 server motherboard

http://www.wired.com/2014/04/openpower/
CAPI and Linux enable innovation from the OpenPOWER Foundation

Smart Acceleration enabled by CAPI (Coherent Accelerator Processor Interface) Technology

- Smart, simplified attach for accelerators: GPUs, flash memory, networking & FPGAs
- Improves performance, reduces latency, and provides more workload for your dollar
- Leveraged by emerging applications built on Linux

CAPI is evolving with open technology
典型 I/O 模型流程

流程与共存模型

优点

- 虚拟地址与数据缓存（显著减少延迟）
- 更简单，自然的编程模型（避免应用程序重写）
- 使应用程序在 I/O 上不可行（指针追逐，共享内存信号量，...）
CAPI Attached Flash – CAPI Technology in Action

Identical hardware with 2 different paths to data

Flash System 840

Conventional PCIe I/O

CAPI

PCle I/O  CAPI + FPGA

IOPs per HW Thread

16,150  108,438

PCle I/O  CAPI + FPGA

Latency (us)

466  199

Power S822L

redislabs

ubuntu®

Supported by Centennial

Power Systems

IBM
IBM Power Systems

Open Innovation to put data to work

- Designed for Big Data
- Superior Cloud Economics
- Open Innovation Platform
Thank you.

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GRACIAS