What's going on in the market?
Saving money with commonality!

What's going on in the market?

Commonality
- ###
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- #

Visibility
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Software Stack Components
- Applications
  - DB2, WAS, Domino, postgres, Apache, ...
- Operating Systems
  - Windows, AIX, Solaris, Linux, ...
- Hypervisors
  - VMWare, Xen, PowerVM, KVM, ...
- HW Architecture
  - x86_64, IA64, POWER, ARM, PCI, Ethernet, ...

Difference = $$

Evolution of SW Stack

Open source – driving commonality & reducing expense for customer to adopt Power
What has been changing for customers?
Their buying habits have flipped!

UNIX Market Priorities

1. Benchmarks
2. Differentiation
3. TCO

Linux Market Priorities

1. TCA
2. Standardization
3. Performance

The “Technologist's Challenge” becomes providing value-add in a standard's-based market.
Industry trends

• **The number of companies designing & building servers is increasing**
  – Traditionally there have been few companies designing systems: HP, IBM, SUN, Dell, etc.
  – Today there are many more: Google, Microsoft, Facebook, Rackspace, Huawei, Sugon, Inspur, etc.
  – A fairly mature ecosystem including the Taiwanese ODMs is a key enabler of this trend

• **Numerous disruptive forces are impacting these custom system designs and driving designers to consider new ways of innovating**
  – Ability to handle rapid growth in Big Data & Analytics based solutions
  – Choice and Innovation
  – CPU SOC integration drive need for chip development

• **These trends create a need for a server targeted “chip-system-software” ecosystem**
  – IBM has technology and a software stack ready to meet these needs
  – IBM recognizes the need to work with partners to create this ecosystem
  – IBM recognizes the need for choice and options in processor sourcing
Welcome to the waitless world

Linux on Power Strategy

Ecosystem

Linux is a common base

Support for:
• Open Source and ISV’s
• Little endian base - OpenStack API support
• The three Major Linux Distros
• Digital purchasing enabled from IBM
• OpenPOWER Foundation

Solutions Differentiated for Client Value

• Big Data and Analytics
  • Delivering differentiated integrated solutions leveraging in-memory, flash, and acceleration technologies
• Cloud
  • Delivering tailored offerings and reference configurations to Services Providers and MSPs
• Open Source
  • Deliver optimized e-Commerce and Big Data business application stacks from operating systems to scripting languages and databases

Value add Infrastructure

Infrastructure matters

• Comprehensive Portfolio
• Price/performance advantaged Linux only offerings
• POWER8 Processor’s built for data
• CAPI and GPU technology
• OpenPOWER Community Innovation

CAPI - Coherent Accelerator Processor Interface
GPU - Graphics Processing Unit
IBM investing in the Linux ecosystems & open innovation

5 IBMers contributing to Linux and Apache Projects

1999

2016
50k+ IBMers contributing to 150+ open organizations

Blockchain
Hyperledger

Cloud Foundry

NodeJS

Docker

Openstack

Spark

Cloud Standards Customer Council

OpenPOWER

100+ OpenPOWER-based innovations under way

IBM Linux engineering assertions for Power

- Linux = Common Linux
- KVM = Common KVM
- Containers = Containers
- OpenStack = OpenStack

Bare-metal support
KVM guest support
PowerVM LPAR support

Open Infrastructure

Virtualization / Containers

Linux Operating Systems

Blockchain

Open Source Databases

Supported by Canonical
Welcome to the waitless world

Linux on Power transitions to little endian

<table>
<thead>
<tr>
<th>Year</th>
<th>SLES 11 (3/09)</th>
<th>RHEL 6 (11/10)</th>
<th>RHEL 7 (6/14)</th>
<th>14.04 LTS (4/14)</th>
<th>14.10 (10/14)</th>
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Standard Release Support

Extended Release Support

Release/update

Projected release/update

- Red Hat lifecycle information - https://access.redhat.com/support/policy/updates/errata/
- SUSE lifecycle information – https://www.suse.com/lifecycle/
- Ubuntu lifecycle information - https://wiki.ubuntu.com/Releases
Linux rolling out – latest status

**RHEL 7.3 “coming soon” BE & LE**
- Expected to have support for the Minsky systems and Nvidia’s P100 GPUs

**RHEL 7.2 available (BE & LE)**
- Announced and available - November 2015
- Continues to deliver both LE and BE versions – LE is where the investments continue
- Both LE and BE runs in PowerVM LPARs and in KVM guests
- *Normal support of updated “Alpine” and “Brazos” offering*
- LE supports “L” and “LC” systems bare-metal and Nvidia K80 GPUs bare-metal

**RHV 4.0 for Power available and updated** – provides KVM from Red Hat for Power

**CentOS 7.2 ppc64le now available**
- Normal “community supported” operating system.  *New TSS support offering.*

**Ubuntu 16.04 (and 16.04.1) LTS (LE only) now available**

**SLES 11 SP4 (BE only) updated for larger memory footprint on E880 systems**
- The base for SAP HANA deployments

**SLES 12 SP2 (LE only) coming soon**

**SLES 12 SP1 (LE only) available**
- Continues to be POWER8 LE only
- *Normal support of updated “Alpine” and “Brazos” offering*
- Optimized for Power enterprise systems and PowerVM LPARs
KVM on Power enables open deployment

**Strategy:**
- Bring base components in parity with KVM on x86 – “KVM should be KVM”
- Co-exists peacefully with other end-points, whenever makes sense.
- Enables hybrid clouds with common management environments

- **Platform Management**
  - Custom management
  - Cloud based

- **H/W Management**
  - Custom scripting
  - Heavily Automated
  - Open technologies

- **Procure:**
  - PXE, IPMI
  - xCat, Puppet, Chef, custom scripts

- **Manage:**
  - OpenStack Custom Scripts

- **Deploy:**
  - Enables KVM products from Linux vendors – Ubuntu KVM, RHEV, others
KVM on Power directions

1. Encouraging KVM across the operating systems and partners
   • IBM PowerKVM -- RHV for Power -- Ubuntu KVM

2. Expand the ecosystem – OpenPower – a related program
   • Deliver repository for KVM on Power technology
     open-power.org based. Presented at April 2016 OpenPOWER summit
     Base HostOS support for successive generations of processors, platforms,
     technologies Virtualization layer to support legacy OS on new platforms

3. Expand and extend KVM and technology virtualization
   • SRIOV enablement and exploitation
   • Research and extend accelerator technologies - FPGA and GPU virtualization
   • Performance optimizations

Storage-rich offerings for Spark, Hadoop and big data workloads

**IBM Power System S812LC**
Experience the advantages of running your Hadoop, Java, open-source and industry applications on a platform designed and optimized for data and Linux.

- View specs
- Learn more

“Habanero”

**IBM Power System S822LC for Big Data**
This storage-rich, high data throughput server design was built on open standards to meet the big data workloads of today—and grow with your needs for tomorrow.

- View specs
- Learn more

“Firestone”

Compute intensive solutions for cloud and HPC workloads

**IBM Power System S821LC**
Compute-intensive workloads can now benefit from two POWER8 processors in a 1U form factor. This server delivers the density your business needs for virtualization, database, and HPC deployments.

- View specs
- Learn more

“Stratton”

**IBM Power System S822LC for Commercial Computing**
Open standards-based system that provides flexible deployment options for hybrid cloud, big data, and business-critical applications.

- View specs
- Learn more

“Briggs”
Next Wave of Acceleration: Breakthrough performance for your GPU accelerated applications

IBM Power System S822LC for High Performance Computing

Experience unprecedented performance and application gains with the new POWER8 with NVLink—delivering 2.8X the CPU-GPU bandwidth compared to x86 based systems.

Learn more  Access to Acceleration Labs
IBM Supports Linux for the Enterprise

Partnering to provide a complete support solution for implementing and managing the Linux operating system in enterprise server and cloud environments

- IBM delivers consistent little endian support for the enterprise across leading Linux distributors: Red Hat, SUSE, Ubuntu
- One Contract, One Phone Number for Linux environment support
- IBM’s support approach focuses on speed to resolution
- Seamless collaboration on multi-vendor products as your single source provider
Power Systems has robust solutions from IBM, ISVs & the Open Source Community
New database paradigms

Relational Databases

Instant insight from real-time operational data
Simplified transactions and reporting
Reduced tuning and indexing

Distributed Hierarchical Databases

A scalable data architecture
A parallel and distributed programming model
Open source community innovation (Apache Hadoop)

NoSQL Databases

Analytics capability for multiple data types, often used in mobile and social workloads
Scalability and flexibility for different data store models

In Memory Databases

Increased performance by bringing data closer to compute
Leading Operational DBMSs Available & Optimized for Linux on Power

<table>
<thead>
<tr>
<th>In-Memory, NoSQL, Open Source</th>
</tr>
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<tbody>
<tr>
<td>✓ SAP HANA           ✓ IBM DB2 BLU</td>
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<tr>
<td>✓ MongoDB            ✓ RedisLabs</td>
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<tr>
<td>✓ Neo4j              ✓ Cassandra</td>
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<td>✓ EnterpriseDB       ✓ PostgreSQL</td>
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<tr>
<td>✓ MariaDB            ✓ MySQL</td>
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<tr>
<td>✓ Hadoop             ✓ Spark</td>
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<tr>
<td>✓ InterSystems       ✓ IBM Open Platform</td>
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Welcome to the waitless world

ISV Support
Accelerates software innovation

<table>
<thead>
<tr>
<th>HPC</th>
<th>Cloud</th>
<th>Big Data &amp; Machine Learning</th>
<th>Mobile Enterprise</th>
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Over 1,900 Linux ISVs developing on Power

50 IBM Innovation Centers

Compelling PoCs
Support for little endian applications

- ubuntu
- SUSE
- Red Hat
- FreeBSD

Accelerates software innovation
Over 1,900 Linux ISVs developing on Power
50 IBM Innovation Centers
Compelling PoCs
Support for little endian applications
Learn more about Linux on Power Systems

Power Systems Linux Portal
(Product Information)

www.ibm.com/systems/power/software/linux/

Linux on Power Community
(developerWorks)

@ibmpowerlinux

The OpenPOWER Foundation

http://openpowerfoundation.org/

plus.google.com/communities/100156952249293416679
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Thank You!