ARROW | Data Center

Enterprise Computing Solutions - North America

Intel® X86 Servers
What Sellers Need to Know

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Intel Company Overview

Intel Corporation was founded in 1968 by two scientists Robert Noyce and Gordon Moore. Intel's corporate headquarters is in Santa Clara, California. Intel employs approximately 107,000 employees worldwide, with net revenue of $52.7 billion USD in 2013.

Noyce and Moore produced the world's first microprocessor in 1971. Gordon Moore authored "Moore's Law," which was described in his 1965 paper as the observation that, over the history of computing hardware, the number of transistors in a dense integrated circuit doubles approximately every two years. The CNET article, "Moore's Law: The Rule That Really Matters in Tech" proves that 47+ years later, this rule still applies.

Intel is dynamically changing the focus of the company beyond what the IT community views as its traditional role. Intel has stated its goals in the Intel 2013 Annual Report with an overall mission of being the "preeminent computing solutions company that powers the worldwide digital economy."

In addition, the following objectives are outlined in the report:

"As a result, we are transforming our primary focus from the design and manufacture of semiconductor chips for personal computing (PC) and servers to the delivery of solutions consisting of hardware and software platforms and supporting services across a wide range of computing devices."

"To succeed in this changing computing environment, we have the following key objectives:

- Cloud computing, ultra-mobile devices, and wearables® technology is the best choice for any computing device, including PCs, data centers, cloud computing, ultra-mobile devices, and wearables

- Be the platform of choice for any operating system

- Maximize and extend their manufacturing technology leadership

- Extend to adjacent services such as security, cloud, and foundry

- Expand platforms into adjacent market segments to bring compelling new System-on-Chip (SoC) solutions and user experiences to ultra-mobile form factors, including smartphones and tablets, as well as notebooks (including Ultrabook devices and 2 in 1 systems), embedded systems, and microserver applications

- Develop platforms to enable devices that connect to the Internet of Things and to each other to create a computing continuum that offers consumers a set of secure, consistent, engaging, and personalized forms of computing

- Strive to lower the footprint of our products and operations, as well as be an asset to the communities we work in

As part of this transformation, Intel acquired McAfee, Inc. in February 2011 and rebranded the division in early 2014 as Intel Security. Intel is building a new level of security into every facet of computing technology through a combination of hardware and software. This division also provides a wide range of security solutions for large enterprises and small business.

X86 Server Marketplace

The server market is very dynamic depending upon the economic conditions. Web Hosting Geeks published an article entitled, "Has the Worldwide Server Market Rebounded?" that looks at recent trends and the outlook for the server market in the future.

In the U.S., there are five major players in the server market – HP, IBM, Dell, Oracle, and Cisco. Gartner analyst Errol Rasit outlines the opportunities for each vendor in the cbronline.com article, "Top 5 Companies Driving the Server Market 2014."

Also from an overall market perspective, Richard Fichera, VP and Principal Analyst at Forrester, discusses customer server buying trends as the first of two speakers in the webcast Get Forrester's Perspective on Today's Server Market (29:56 minutes). HP is the sponsor of the presentation and provides an update on their HP ProLiant Gen8 servers.

Competitive conversions from IBM Power-based AIX systems, HP Itanium, or HP PA-RISC-based HP-UX systems and Oracle SPARC-based Oracle Solaris systems pose a ripe opportunity for sellers.

The following SUSE white papers provide very good detailed discussions of the features and technology differences of each environment.

- "Modernize Your Data Center" (IBM AIX to x86/SUSE)

- "The Case for Migrating from Itanium/HP-UX to x86/ SUSE Linux Enterprise Server"

- "The Case for Migrating from SPARC/Oracle Solaris to x86/SUSE Linux Enterprise Server"

Intel Processor Innovation

- New technology generations provide improved performance and/or reduced power. As Intel fellow Mark Bohr explains in his video, "14nm Transistor Explained – Following the Path of Moore's Law," the reduction in transistor size from 22nm to 14nm provides better performance and less overall power consumption. The technical presentation, "Advancing Moor's Law in 2014 – The Road to 14nm," provides additional details of the benefits of 14nm transistors.
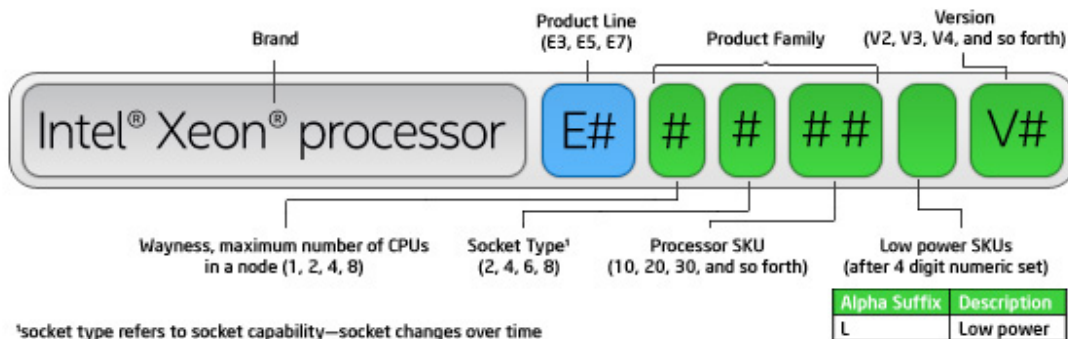
Intel Server Processors

- The latest version of Intel's server processors is Haswell, which was developed on a 22-nanometer process and is the successor to Ivy Bridge. Intel has a "tick-tock" strategy – an innovation cadence in microprocessor manufacturing and microarchitecture with new advancements every other year.

- The next generation of processors in 2015 will be Broadwell, Intel's fifth-generation Core processors, and will ship in the first quarter of next year. In the second half of 2015, users will be able to buy the newer Skylake architecture, which will bring wire-free computing and significant performance upgrades. Intel's next generation 10nm Cannonlake microarchitecture will arrives in 2016. The Cannonlake microarchitecture being a die shrink and is regarded as a "TOCK" as interpreted through the Intel Tick-Tock model, hence it will replace the Skylake platform utilizing the benefits of the same processor architecture on a smaller 10nm node.

Intel Mainstream Platforms Comparison Chart

	Intel Ivy Bridge Platform	Intel Haswell Platform	Intel Broadwell Platform	Intel Skylake Platform	Intel Cannonlake Platform
Processor Architecture	Ivy Bridge	Haswell	Broadwell	Skylake	Cannonlake
Processor Process	22nm	22nm	14nm	14nm	10nm
Processors Cores (Max)	4	4	4	4	TBA
Platform Chipset	7-Series "Panther Point"	8-Series "Lynx Point"	9-Series "Wild Cat Point"	100-Series "Sunrise Point"	200-Series "Union Point"
Platform Socket	LGA 1155	LGA 1150	LGA 1150	LGA 1151	TBA
Memory Support	DDR3	DDR3	DDR3	DDR4 / DDR3	DDR4
Thunderbolt	Yes	Yes	Yes	Yes "Alpine Ridge"	Yes
Launch	2012	2013-2014	2015	2015	2016

Intel provides guidance on selecting the proper processor based upon workload in the Intel Xeon Processor-Based Selection Guide. View an explanation of Intel's processor naming conventions in the illustration below. For expanded details, see About Intel Processor Numbers.

Intel Atom Processor

The Intel Atom is a line of ultra-low-voltage microprocessors. The current version of these processors uses the Silvermont microarchitecture. The family of processors designed for use in servers is the 64-bit Avoton family, which uses a 22nm manufacturing process.

The brand names for these processors are:

- Two core model: C2350

- Four core models: **C2550** and C2530

- Eight-core models: C2750 and **C2730**.

The Atom also has families of processors designed and targeted for smartphones (Merrifield, Moorefield), tablets, netbooks, hybrid devices (Bay Trail), and network and communication infrastructure (Rangeley).

More Intel Inside

In addition to the processors, Intel produces a line of Solid State Drives (SSDs) to provide enterprise SSDs to data centers for extreme data throughput. Intel's Data Center SSD Products can provide SSD capacities up to 2.0TB. The Intel Solid State Drive Data Center Family for PCIe Brief provides additional information. Also see a summary of the Intel Data Center SSD product lines in the chart below:

Intel Data Center Product	Capacity (GB)	Sequential Read/Write (max MB/s)	Random 4KB Read/Write (max IOPS)	Form Factor	Interface
DC P3700 Series	400 /800 / 1.6TB / 2.0TB	2,800 / 2,000	460,000 / 175,000	2.5-inch and HHHL AIC	PCI Express Gen 3
DC P3600 Series	400 / 800/ 1.2TB /1.6TB /2.0TB	2,600 / 1,700	450,000 / 56,000	2.5-inch and HHHL AIC	PCI Express Gen 3
DC S3700 Series	100 /200 /400 /800	500 / 460	75,000 / 36,000	2.5 and 1.8 inch	SATA 6 Gb/s
DC S3500 Series	80 / 120 / 160 / 240 / 300 /340 /400 /480 600 / 800 / 1.2TB / 1.6TB	500 / 460	75,000 / 15,500	2.5 and 1.8 inch M.2	SATA 6 Gb/s

In addition, Intel provides high bandwidth I/O adapters. These adapters use the latest technology to provide enterprise class communications for the data center. Intel Ethernet Converged Network Adapters and 10 Gigabit Server Adapters portal provides product information and additional details.

Intel vPro™ Technology

Intel offers a series of processors and network adapters integrated with Intel® Core™ vPro™ Technology. vPro technology adds a comprehensive set of security, manageability, and productivity-enhancing capabilities into specified Intel chipsets and network adapters designed to simplify and accelerate critical IT functions including:

- Threat management that includes protection from rootkits, viruses, and malware

- Identity and website access point protection

- Confidential personal and business data protection

- Remote and local monitoring, remediation, and repair of PCs and workstations

The Intel VPro technology is integrated into the processor; however, some of its features require action to deploy them based on an organization's needs and policies.

Intel Trusted Execution Technology (Intel TXT)

Intel TXT is a hardware-based technology featured in the Xeon processor that establishes a root of trust through measurements between the hardware and pre-launch software components to ensure they are in a known good state. Administrators can set policies for sensitive data and workload placement onto groups of servers known as trusted compute pools.

Intel TXT enables:

- Workloads and data to be run on a trusted server

- Protection of workloads and data

- Avoiding compromising security in the cloud

- Enhanced IT compliance

This technology is explained in detail in this short video "Intel TXT Why it Matters."

Intel Data Center Manager (DCM) Software Portfolio

Intel provides a number of software and appliance solutions that give organizations the ability to manage their data and data centers.

Arrow's portfolio of Intel solutions includes:

- Intel DCM: Energy Director – Data center power management

- Intel DCM: Virtual KVM Gateway and SDK – Centralized data center management and automation of data center operations

- Intel Solutions for Lustre™ Software – Performance and management enhancements to the Lustre distributed file system for HPC clusters

- Intel Mashery API Gateway – Service Management – Software appliance that delivers cloud service brokerage capabilities

- Intel Mashery API Gateway – Tokenization – Software appliance that functions as a tokenization broker for enterprise applications

- Intel Mashery API Management – Datacenter Edition – A platform for complete API management, converging Service Oriented Architecture (SOA) governance with API management

- Intel Service Assurance Administrator (Intel SAA) – Monitoring, remediation, reporting, and management capabilities as part of its service assurance administration software toolset.

Intel DCM: Energy Director

This is the power management solution stack for data centers that provides accurate, real-time power and thermal monitoring and management. Energy Director features include:

Monitoring

- Real-time monitoring of actual power and inlet temp data aggregated to rack, row, and room

- User-defined physical or logical groups

- Receives alerts based on custom power and thermal events

- Power estimation engine for legacy servers lacking power monitoring

- Displays server asset tag and serial number for HP, IBM, and Dell

- Cisco rack and Unified Computing Systems (UCS) support

Trending

- Logs power and thermal data, and queries trend data using filters

- Saves one year of historical data for capacity planning

Control

- Intelligent and patented group policy engine

- Supports multiple concurrent active power policy types at multiple hierarchy levels

- Accepts workload priority as policy directive

- Allows scheduling of policies, including power capping by time of day and/or day of week

- Maintains group power capping while dynamically adapting to changing server loads

- Includes Intel Node Manager 2.0 support for memory power limiting and dynamic core allocation

Agent-less

- Does not require installation of any software agents on managed nodes

Easy integration and coexistence

- Device inventory pre-scan using IP ranges

- Exposes high-level Web Services Description Language (WSDL) APIs

- Can reside on an independent management server or coexist with ISV product on the same server

- Power thermal aware scheduling, including airflow and outlet temperature modeling (OEM-dependent)

- Outet temperature sensor (OEM-dependent)

Scalability

- Manages tens of thousands of servers

Security

- Secured APIs

- Secured communication with managed nodes

- Encryption of all sensitive data

Resources

- **Overview**

- **Product Brief**

- **Intel Datacenter Manager: Energy Director Demo**

- **Request a Free Datacenter Manager Portfolio Evaluation License**

Intel DCM: Virtual KVM Gateway and SDK

The Intel DCM: Virtual KVM Gateway consoles and SDK enable one-to-one capabilities of hardware KVM switching along with the benefits of centralized management. The SDK augments systems and tools by simplifying and automating tasks to integrate and centralize data center operations.

Development features include:

- Device management API – For out-of-band and in-band device discovery, identification, hierarchy management, etc.; provides the capability for device management through web service API

- Remote console management API – Manage virtual KVM consoles from multiple servers crossing different OEM vendors through Java™ applet APIs and JavaScript Object Notation (JSON) based web APIs

- Reference graphical user interface – Provides a simple and functional web interface that implements the remote console management usage; offers reference graphical user interface source code for ISV integration reference

Resources

- <u>Overview</u>

- <u>Product Brief</u>

- <u>Intel Datacenter Manager: Virtual KVM Gateway and SDK Video</u>

- <u>Request a Free Datacenter Manager: Virtual KVM Gateway and SDK trial</u>
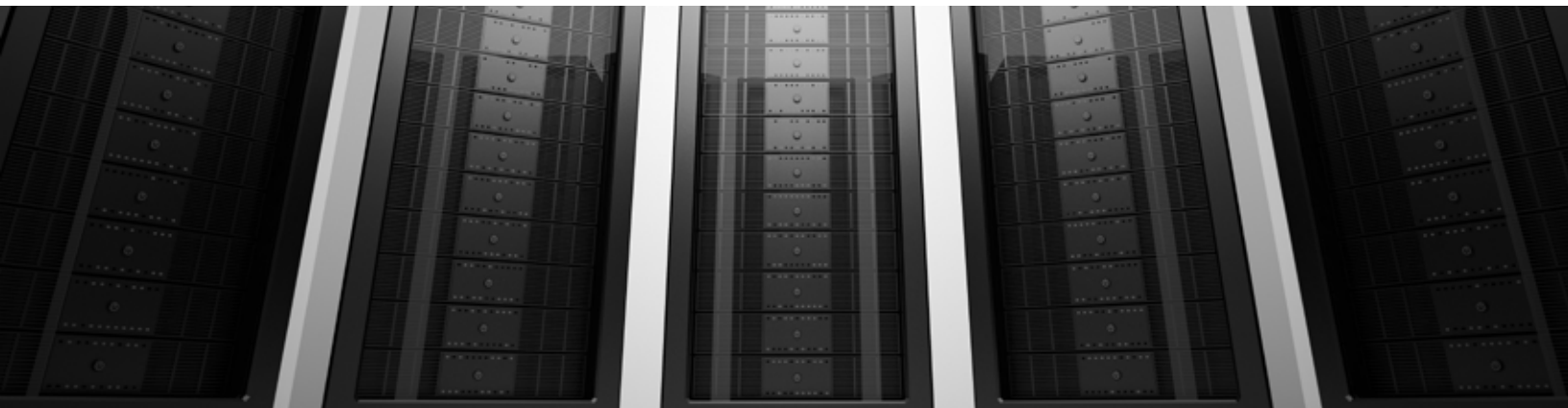
Intel Solutions for Lustre™ Software

Lustre is an open source parallel-distributed file system providing high performance for small workgroup, large-scale, multi-site, and HPC clusters. Lustre-based solutions from Intel bring significant performance and capability enhancements to HPC clusters and enterprise organizations and make parallel storage simpler and more productive.

Intel Enterprise Edition for Lustre software is designed to enable fully parallel I/O throughput across thousands of clients, servers, and storage devices. Metadata and data are stored on separate servers to allow optimization of each system for the different workloads they present. Intel Enterprise Edition for Lustre can also scale down efficiently to provide fast parallel storage for smaller organizations. The object-based storage architecture can scale to tens of thousands of clients and petabytes of data.

Key features include:

- Built on open-source Lustre software

- Intel Manager for Lustre simplifies install and configuration

- Enormous storage capacity and I/O

- Open, documented interfaces for deep integration

- Throughput in excess of 1 terabyte per second

- Resilient, highly available storage

- Centralized, GUI-based administration for management simplicity

- Integrated support for Apache®, Hadoop™, and MapReduce™ applications with Lustre storage

- Rigorously tested, stable software proven across diverse industries

- Flexible storage solution based on Intel-enhanced open source software

- Global 24/7 technical support

Resources

- [Intel Enterprise Edition for Lustre Software Video](#)

Intel Mashery API Gateway – Service Management

Intel Mashery API Gateway – Service Management is a software appliance designed to securely expose or consume application services/APIs on-premises or in the cloud. It delivers service brokerage capabilities, including integration, routing, data protection, middleware for legacy to mobile service enablement, and AAA security. It is deployed as a low-impact proxy at the network or cloud edge.

Features include:

- API Security – Regain control with a centralized policy enforcement point to authenticate, authorize, and govern service interactions with customers, partners, employees, and cloud providers as they consume or deploy applications exposed over APIs

- API abstraction – Innovate faster, gain a competitive edge, and securely expose applications on premises or in the cloud, regardless of the abstraction pattern, delivery method, or protocol

- Cloud service brokerage – Enable IT to integrate, govern, and secure services from 1-n external cloud providers for simplified service consumption by internal departments and developers; aggregate and expose value-added composite applications and data as a third-party intermediary to partners and customers

- Flexibility without compromise – Simplify infrastructure by deploying an easily upgradeable soft-appliance on standard Intel multi-core processor servers; best-in-class performance reduces API and integration performance bottlenecks with no compromise on extensibility or virtualization

Resources

- [Product Brief](#)

Intel Mashery API Gateway – Tokenization

Intel Mashery API Gateway – Tokenization (Tokenization Broker) is a software appliance designed to reduce PCI scope. It functions as a tokenization broker for any enterprise application tasked with handling clear-text primary account number (PAN) data. It works by tokenizing PAN data in documents or API calls and stores encrypted card data in a protected, secure vault where it can be accessed by authenticated applications and users.

Features include:

- Token generation and management

- Secure vault and hardware

- Threat prevention

- Authentication and authorization

- Management and monitoring

Resources

- [Product Brief](#)

Intel Mashery API Management – Data Center Edition

The Intel Mashery API Management – Datacenter Edition is an enterprise-class API security and management gateway that can provide elastic scale and high-performance security and trust enablement for APIs deployed on Amazon's Elastic Compute Cloud (EC2) public cloud. It provides a centralized

control point for managing APIs in a hybrid or a public cloud environment.

Supercharge SOA programs with the agility of API management:

- Integrate and incorporate internal SOA services for API management

- Repackage SOAP or custom protocols as REST APIs for faster developer sharing

- Drive down development costs and share services for re-use across internal teams

Flexible developer portal allows you to:

- Engage internal or external developers with a locally deployed, multi-tenant portal

- Brand the portal, share docs, manage forums, and showcase API galleries all in one place

- Embed a componentized, portal engine, separate from the UI directly into enterprise applications

Maintain data center security practices by:

- Deploying a full-service API Gateway to enforce DMZ grade security and traffic management on APIs

- Tying in authoritative enterprise security and identity systems

- Enforcing fine grain data governance and protection practices to the API data channel

- Positioning internal APIs for Bring Your Own Device (BYOD) programs with mobile friendly security

Manage internal APIs by:

- Managing internal APIs just like real-world products with full packaging, rate limit, versioning, and throttle controls

- Applying sophisticated enforcement or routing workflows using a powerful Eclipse design studio

- Gaining insights into department API usage for internal chargeback programs

Resources

- White paper: A Platform Approach to Enterprise API Management

- Video: The Future of API Management

Intel Service Assurance Administrator (Intel SAA)

Intel SAA increases data center efficiency by allowing more services to be hosted in a software-defined Infrastructure (SDI) and enhancing OpenStack™ cloud operations by ensuring workloads are running on a trusted infrastructure and meeting performance expectations in a shared environment.

Key features of Intel SAA include:

- Controller that optimizes data center resources by collecting deep platform telemetry data from compute node agents allowing optimizing application server placement

- Assured performance that provisions applications in an OpenStack environment using an Intel SAA feature known as Service Compute Unit (SCU)

- Intel Trusted Execution Technology (TXT) to ensure infrastructure trust requirements

Resources

- Intel SSA Product Overview

- Intel SSA News Fact Sheet

- Intel SSA Product Brief

- White Paper: Intel: Integrated OpenStack Cloud Solution with Service Assurance

Intel x86 Vendor Profiles

CISCO®

Cisco focuses their offerings around blade, rack, and integrated systems Cisco Unified Computing Products (UCS) offerings include Cisco UCS Invicta , Cisco USC M-Series Modular Servers, Cisco USC B-Series Blade Servers, and Cisco USC C-Series rack servers. System management is provided by Cisco UCS Manager, Cisco UCS Central, and Cisco UCS Director.

DELL®

Dell's PowerEdge Servers are offered as PowerEdge towers, PowerEdge Racks, and Dell Shared infrastructure. Dell OpenManage portfolio provides system management capabilities. Dell boasts their PowerEdge VRTX is the first IT integrated IT solution designed specifically for remote-office. Dell's press release "Dell Introduces its Most Advanced Server Portfolio to Address Broadest Range of Business Computing Needs" from September 8, 2014, provides the latest update on Dell's portfolio.

FUJITSU®

Fujitsu provides a diverse product line with x86, UNIX, and mainframe servers. Fujitsu SPARC servers use the SPACRC64™ processor and run the Oracle Solaris (UNIX) operating system. Fujitsu's x86-based lineup includes the PRIMERGY Blade Servers, PRIMERGY rack server, PRIMERGY tower servers, and PRIMERGY Scale out servers. In addition, Fujitsu has the high-end x86-based PRIMEQUEST systems designed for business-critical and mission-critical computing.

HP®

HP x86 servers comprise the ProLiant product line. The HP ProLiant BL Series are blade solutions; the HP ProLiant ML Series are tower servers; and the HP ProLiant DL Series are rack servers. HP also offers the HP ProLiant SL Series, Apollo Systems, MoonShot System, and HP Clustered Platforms as scalable system solutions.

HP's ProLiant Gen9 technology is designed to augment HP's x86 solutions by providing integrated lifecycle management, dynamic workload acceleration, automated energy optimization, and intuitive system architecture and design.

LENOVO®

Lenovo provides a line of x86 computer systems that includes laptops, tablets, desktops, all-in-ones, workstations, servers, and storage. Lenovo's line traditionally focused on rack servers and towers with their ThinkServer® tower servers and ThinkServer rack servers. With the acquisition of IBM's System x® line, Lenovo's server line is expanded to not only include System x tower servers and System x rack servers, but also into new areas for Lenovo with System x high density servers, System x blade servers, and System x enterprise servers.

The System x product line boasts X6 architecture that provides X6 modular book technology, integrates flash memory technology, and provides for features on demand.

ORACLE®

Oracle provides a portfolio of servers that include SPARC and x86 systems. Oracle SPARC servers run the UNIX-based Oracle Solaris operating systems. Sun Server X4 series are rack-mounted servers. The Sun Blade x86 Modules provide a blade solution; and the Sun Netra x86 Servers provide carrier-grade servers for communications deployments.

IBM® POWER SYSTEMS™

IBM offers their IBM Power Systems line of servers as a solution for large enterprises. The latest systems are designed with their POWER8™ architecture whose designs are available for licensing under the OpenPOWER Foundation. POWER8 is designed to be a massively multithreaded chip with each of its cores capable of handling eight hardware threads simultaneously, for a total of 96 threads executed simultaneously on a 12-core chip. For external communication, POWER8 uses the CAPI port (Coherent Accelerator Processor Interface), which is layered on top of PCI Express 3.0. POWER8 comes in two variants, one 6-core and one 12-core version, each fabricated using a 22nm process.

Systems based upon the POWER8 technology include the following:

Systems Based on POWER8 Technology

Model	Form Factor	Processors	Max Cores	Operating System	Max Memory	Virtualization
S812L	2U rack	1	512GB	Red Hat Linux™ , SUSE™ Linux, Ubuntu™ Linux	12	IBM PowerVM™, IBM PowerVM Linux PowerKVM®
S814	4U rack	1	512GB	IBM AIX™, IBM i™, Red Hat Linux , SUSE Linux, Ubuntu Linux	8	IBM PowerVM, IBM PowerVM Linux, PowerKVM
S822	2U rack	2	1024GB	IBM AIX, IBM i, Red Hat Linux, SUSE Linux, Ubuntu Linux	20	IBM PowerVM™, IBM PowerVM Linux PowerKVM®
S822L	2U rack	2	1024GB	Red Hat Linux, SUSE Linux, Ubuntu Linux	24	IBM PowerVM Linux PowerKVM
S824	4U rack	2	1024GB	IBM AIX, IBM i, Red Hat Linux, SUSE Linux, Ubuntu Linux	24	IBM PowerVM Linux PowerKVM
S824L	4U rack	2	1024GB	Red Hat Linux, SUSE Linux, Ubuntu Linux	24	IBM PowerVM, IBM PowerVM Linux, PowerKVM
E870 1 or 2 Nodes	7U rack	8 (4 per node)	2TB or 4TB	IBM AIX, IBM i, Red Hat Linux, SUSE Linux, Ubuntu Linux	40 or 80	IBM PowerVM, IBM PowerVM Linux, PowerKVM
E880 1,2,4 Node	7U rack	16 (4 per node)	4TB, 8TB or 16TB	IBM AIX, IBM i, Red Hat Linux, SUSE Linux, Ubuntu Linux	48, 96 or 192	IBM PowerVM, IBM PowerVM Linux, PowerKVM

Competitive Selling Points Intel x86 vs. IBM Power Systems

- Simultaneous multithreading (SMT) is a technique for improving overall efficiency by providing multiple independent threads of execution to better utilize resources provided by processor architectures. Intel refers to this feature as hyper-threading and multithreading by other vendors. Intel Xeon processors offer two threads per core. IBM Power 7™ processors provide four threads per core, while the IBM POWER8 processors provide eight threads per core. Applications must be written to take advantage of this feature. In a competitive situation when matching processor throughput with IBM Power systems, multiple Xeon processor may need to be configured to match threading throughput.

- Many organizations have adopted a standard for server virtualization. Intel x86-based systems support VMware vSphere, Citrix Xen Server, Microsoft Hyper-V, and KVM for virtualization. IBM Power-based systems support only the IBM proprietary PowerVM and a version of KVM named PowerKVM for virtualization. Many customers have standardized around VSphere, Xen, or Hyper-V, meaning they must adopt a new virtualization technology in order to adopt IBM Power systems.

- Organizations have also standardized on Windows for their servers. IBM Power Systems only support their proprietary AIX operating environment along with Red Hat, SUSI, and Ubuntu Linux. IBM no longer offers a product that runs Windows with the sale of their System x brand to Lenovo.

- When compared to IBM's Power systems dedicated to Linux, HP ProLiant servers offer more internal storage.

- Generally, IBM Power-based Linux systems will have a higher cost of ownership (hardware and software acquisition costs along with any services charges incurred) over three years when compared to HP ProLiant servers. A calculation based upon relevant configurations and individual sales situations should be completed to verify this assertion.

Resources

> Intel Xeon Processors Technical Resources

> Intel Product Information and Comparison Tool – Provides detailed product information on Intel processors, chipsets, boards and kits, servers, solid state drives, networking and I/O; software also provides a reference of products by code names.

> Power consumption is an important factor when considering a new server purchase. The following are the power calculators for major server vendors:
  - Cisco – UCS Power Calculator
  - Dell – Datacenter Capacity Planner
  - HP BladeSystem Sizer
  - HP ProLiant Power Calculators
  - HP Power Advisor
  - IBM System Energy Estimator for Power Systems
  - IBM System x Power Calculator
  - Oracle Sun Power Calculators

White Papers

- IDC: The Business Value of Blade Infrastructure – This analyst report discusses the challenges of IT complexity and how these challenges lead to business inefficiency. It presents Jeb Scaramella's analytics perspective along with how blade systems and management tools address these IT challenges.

- IDC: Business Risk: Effective Technology Protecting Your Business – IDC looks at customer-based studies and how to mitigate business risk and avoid unplanned downtime.

- IDC: Support for Today's Converged and Integrated Environments and Highly Virtualized Architectures –This paper discusses how HP OneView provides important management tools for systems management.

- IDG: Rethinking IT to Drive Business Value – This paper highlights voice-of-the-IT-buyer research and provides insights on the challenges and opportunities for IT to drive innovation.

- IDC: Business Value of Blades Infrastructure –This white paper examines how seven enterprises and mid-size companies were able to reduce their annual IT cost by 58% by migrating to a blade platform.

Are You Five Years Out?

Most people live in the present. The world of now. But a handful of us work in a unique world that doesn't quite exist yet—the world of Five Years Out.

Five Years Out is the tangible future. And the people who live and work there know that new technologies, new materials, new ideas and new electronics will make life not only different, but better. Not just cheaper, but smarter. Not just easier, but more inspired.

Five Years Out is an exciting place to be. So exciting that, once you've been there, it's hard to get excited about the present. Because we know what's coming is going to be so much better.

Five Years Out is a community of builders, designers, engineers and imaginers who navigate the path between possibility and practicality. Creating the future of everything from cars to coffeemakers.

Are you one of them? Then you're probably working with us.

In Person

800 544 7674
Call to talk or set up a face-to-face meeting
with one of our knowledgeable representatives.

Online

arrow.com
Visit our website for everything from the
latest news to line card information.

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Five Years Out

Arrow Electronics, Inc.
Enterprise Computing Solutions

7459 South Lima Street
Englewood, CO 80112, USA