IBM Power System E880

POWER8 enterprise-class server that's been designed to support the most mission-critical applications

Highlights

- Delivers twice the performance per core versus the competition,[1] with enterprise scalability for the most demanding data centric applications
- Manages fluctuating business demands with dynamic, on-demand private cloud capacity
- Minimizes risk with secure delivery of data and services on a proven, reliable platform
- Enables open innovation and choice for AIX®, IBM i and Linux

Data is emerging as the world's newest natural resource and the basis for a new kind of competitive advantage. Yet, for many organizations, the increasing volume, variety and influx of data is straining their traditional IT infrastructures that were never designed to handle the magnitude of complexity in these new workloads. To keep up with the fast pace of today's business climate, it is essential for organizations to capitalize on next-generation infrastructures that integrates analytics-optimized systems and technologies to dynamically meet the demands of a data driven world.

The IBM® Power® E880 enterprise server is designed to provide the highest levels of reliability, availability, flexibility and performance in order to provide clients with a world-class enterprise private and hybrid cloud infrastructure. Through enterprise-class security, efficient built-in virtualization that drives industry-leading workload density, and dynamic resource allocation and management, the Power E880 server consistently delivers the highest levels of service across hundreds of virtual workloads on a single system.

Industry-leading IBM POWER8 performance

Built with innovation that puts data to work, IBM Power Systems™ provides the foundation for organizations to bring insight to the point of impact quickly. The Power E880 is a large-scale, symmetric multiprocessing system that delivers its exceptional performance using enterprise

IBM POWER8™ processors, each a single chip module (SCM) with a choice of either eight or twelve cores running at greater than 4 GHz and simultaneous multithreading executing up to eight threads per core. Each SCM has dual memory controllers to support up to 2 TB of memory and utilize up to 128 GB off-chip eDRAM L4 cache to deliver 230 GBps of sustained memory bandwidth. Input/output (I/O) bandwidth is also dramatically increased using dual PCIe Gen3 I/O controllers, which are also integrated onto each SCM to further reduce latency. A single 4-, 8-, 12 or 16-socket Power E880 system can deliver over twice the performance per-core of competitors, enabling applications to run faster and be more responsive.[1]

IBM Active Memory™ Expansion (AME) is an option which can increase the effective memory capacity of the system, enabling a partition to perform significantly more work with the same physical amount of memory resource. POWER8 processors contain an accelerator to provide the compression/decompression of memory content and memory may expand up to 100 percent.

IBM POWER® architecture is the heart of the OpenPOWER Foundation, a growing community built around an open technology platform to foster new opportunities and design the next generation of applications and technologies. Leveraging open standards, Power Systems provides developers with tools tuned for a platform that boosts productivity and performance by removing constraints imposed by commodity architectures.

Mainframe-inspired availability features

Leading with world-class RAS capabilities, the Power E880 server offers Active Memory Mirroring for Hypervisor feature, which is designed to prevent a system outage in the event of an uncorrectable error in memory being used by the system hypervisor. Also included as standard on all configurations of the Power E880 server are redundant service processors, system clocks, and processor and memory voltage regulators with dynamic failover capabilities.

The POWER8 processor module is implemented in 22 nm technology, with up to twelve processor cores, L2 and L3 caches, a number of processor level accelerator functions, an on-chip controller used for thermal and power management, and PCIe controllers for I/O connectivity. Integration of these components is intended to enhance reliability compared to comparable designs with discrete components.

The processor and memory subsystem uses first failure data capture (FFDC) mechanism for fault detection and isolation. They incorporate advanced technology and design techniques for soft error avoidance. To reduce repair actions for solid faults, spare capacity is integrated with spare processor fabric and memory bus data lanes, and spare bit lanes within L2 and

L3 caches. Spare DRAM modules on memory DIMMS are also provided in addition to memory Chipkill correction. The Power E880 server comes standard with Processor Instruction Retry and Alternate Processor Recovery standard which are designed to enhance application availability and improve the quality of the service provided. These provide for the continuous monitoring of processor status and for certain errors, the capability to retry workload on a processor core and if required, redirect workload to an alternate processor where applicable without terminating the application using the processor core.

The system infrastructure is designed with hot-plug, hot-swappable, redundant components including system fans and power supplies. PCIe adapters are also hot-swappable.

The modular design of the IBM Power System E880 allows clients to start with what they need and grow by adding additional building blocks, all with minimal disruption to the base system.

Power Enterprise Pools is an exciting, exclusive, multisystem IBM Power server infrastructure offering designed to provide a highly resilient and flexible IT environment in support of your most demanding business applications. Power Enterprise Pools with Mobile Capacity on Demand (CoD) delivers unprecedented flexibility and availability by providing clients with the ability to dynamically move processor cores and/or memory between systems within a pool of Power 780, Power 795 and Power E880 servers. Other enhanced availability options found on the Power E880 server center around the CoD offerings. Clients can install processors or memory and activate them on a 30-day trial (Trial CoD), a day-to-day basis (Elastic CoD) or permanently (Capacity Upgrade on Demand (CUoD). Additionally, Utility CoD allows clients to install processors and have them automatically activated as needed on a minute-to-minute basis. Clients may start small and grow with systems designed for continuous application availability.

In addition, all new Power E880 servers are shipped with a number of Elastic CoD processor and memory days bundled in for no charge. The number of Elastic CoD processor and memory days are dependent on the number of processor cores initially ordered with the system. These Elastic processor and memory days can be used for any purpose the client desires, including application workload spikes, system maintenance or testing new applications.

These capabilities help to increase system availability and allow more work to be processed with less operational disruption. For enhanced server availability, the Power E880 server can be clustered with the IBM PowerHA® SystemMirror for disaster recovery (DR) or with the DB2® pureScale® software for continuous database availability.

Built-in PowerVM virtualization capability

IBM PowerVM® Enterprise technology now comes built-in with every Power E880 server. With PowerVM on the Power E880 server, you have the power and flexibility to address multiple system requirements in a single machine. IBM Advanced Micro-Partitioning® technology supports multiple virtual machines (VMs) per processor core and can run up to 1000 VMs on a single server—each with its own processor, memory, and I/O resources. Processor resources can be assigned at a granularity of 1/100th of core. Consolidating systems with PowerVM can help cut operational costs, improve availability, ease management and improve service levels, while allowing businesses to quickly deploy applications.

Multiple shared processor pools allow for the automatic non-disruptive balancing of processing power between VMs assigned to shared pools, resulting in increased throughput. It also provides the ability to cap the processor core resources used by a group of VMs to potentially reduce processor-based software licensing costs.

In addition, PowerVM technology on the Power E880 server provides Active Memory™ Sharing, a technology that allows you to intelligently and dynamically reallocate memory from one VM to another for increased utilization, flexibility and performance. Active Memory Sharing enables the sharing of a pool of physical memory among VMs on a server, helping to increase memory utilization and drive down system costs. PowerVM technology provides the Virtual I/O Server (VIOS) which is a special purpose VM that can be used to virtualize I/O resources for AIX, IBM i, and Linux VMs. VIOS owns the resources that are shared by VMs. A physical adapter assigned to the VIOS can be shared by many VMs which reduces cost by eliminating the need for dedicated I/O adapters. Shared storage pools allow storage subsystems to be combined into a common pool of virtualized storage that can be shared by the VIOS on multiple Power Systems servers.

Finally, in order to provide enhanced availability on the Power E880 server, all systems include Live Partition Mobility (LPM) which supports the movement of a running AIX or Linux or IBM i VM from one Power Systems server to another without application downtime, helping avoid application interruption for planned system maintenance, provisioning, and workload management. LPM can be used to simplify migration of operating environments to new servers temporarily or permanently.

Broad business application support

The Power E880 server is designed to give clients the flexibility to run the AIX, IBM i and Linux operating systems concurrently. The AIX operating system is IBM's industrial-strength UNIX offering, providing exceptional reliability, availability, and security for business-critical applications. AIX is designed to be compliant under the Common Criteria of CAPP/EAL4+ and has a history of receiving that certification including certification for the VIOS, and workload partitions virtualized environments.

The Power System E880 at a glance

Configuration options	Per building block	System maximum
Processor cores	32 x 4.35 GHz POWER8 processor cores 40 x 4.19 GHz POWER8 processor cores 48 x 4.0 GHz POWER8 processor cores	128 x 4.35 GHz POWER8 processor cores 160 x 4.19 GHz POWER8 processor cores 192 x 4.02 GHz POWER8 processor cores
Sockets	4	Up to 16
Level 2 (L2) cache per core	512 KB	
Level 3 (L3) cache per core	8 MB eDRAM shared L3	
Level 4 (L4) cache	Up to 128 MB eDRAM L4 (off-chip) per socket	
Enterprise memory	32 DIMMs Up to 8 TB of 1600 MHz DDR4	Up to 128 DIMMs Up to 32 TBs of 1600 MHz DDR4
Integrated PCIe adapter slots	8 PCIe Gen3 x16	Up to 32 PCIe Gen3 x16

The Power System E880 at a glance		
Expansion features (optional and depending on the operating systems)		
DVD bay	1	
Max PCIe Gen3 I/O drawers (12 PCIe Gen3 slots each)	Up to 4	Up to 16
Max DASD/SSD I/O drawers (24 SFF bays each)	Up to 128	Up to 168
Standard features		
System control unit	1	
Flexible service processors	2 in system control unit	
IBM POWER Hypervisor™	LPAR, Dynamic LPAR; Virtual LAN (Memory to memory interpartition communication)	
PowerVM Enterprise Edition (included)	Micropartitioning (up to 20 micropartitions per processor); Multiple Shared Processor Pools; Virtual I/O Server; Shared Dedicated Capacity; Live Partition Mobility (LPM) and Active Memory Sharing (AMS)	
RAS features	Processor instruction retry Alternate processor recovery Selective dynamic firmware updates Chipkill memory with DRAM sparing Dynamic L2 and L3 cache column repair Dynamic L3 cache column repair Dynamic inter-node bus repair Redundant service processors with automatic failover Redundant system clocks with dynamic failover Redundant, hot-swappable power supplies and cooling fans Concurrent add/repair of I/O drawers Hot-swappable disk bays in EXP24S Hot-plug/blind-swap PCIe slots Dynamic processor deallocation Extended error handling on PCIe slots Active Memory Mirroring for Hypervisor	
Capacity on Demand features (optional)	Processor and/or Memory Capacity Upgrade on Demand (CUoD) Elastic Processor and/or Memory Capacity on Demand (CoD) Trial Processor and/or Memory CoD Utility CoD Power Enterprise Pools	
Operating systems	AIX, IBM i and Linux for Power	
High availability	Power HA Editions	
Power requirements	Operating voltage: 200 to 240 V ac	
System dimensions	7 EIA (7U) space in a 19-inch rack	22 EIA (22U) space in a 19-inch rack
Warranty	24x7, same day response for one year; on-site (varies by country). Warranty service upgrades and maintenance are available.	

The IBM i is the integrated operating system for Power Systems that is built for efficiently deploying business processing applications. IBM i integrates a trusted combination of relational database, security, web services, networking and management capabilities. It is a highly scalable operating system, delivering the capability to run multiple applications on a single instance of the operating environment. The Red Hat and Novell/SUSE Linux for Power operating systems may be ordered from IBM and select Linux distributors and include many open source applications, tools and utilities. IBM is firmly committed to Linux and has enabled many of the unique IBM Power Architecture® technologies into the Linux kernel. The Power E880 platform offers the flexibility and performance to consolidate x86 servers running a mix of web, application and database workloads, helping clients to better manage growth without adding complexity.

Why IBM?

IBM understands the need to optimize your IT investment. Being efficient, responsive and responsible is what IBM is about. IBM is a leader in providing business solutions and services. That success not only comes from years of experience and expertise, but from recognizing that your needs come first.

For more information

To learn more about the IBM Power System E880, please contact your IBM representative or IBM Business Partner, or visit the following website: **ibm.com**/systems/power/hardware/e880/index.html

Additionally, IBM Global Financing provides numerous payment options to help you acquire the technology you need to grow your business. We provide full lifecycle management of IT products and services, from acquisition to disposition. For more information, visit: **ibm.com**/financing

IBM Systems
Route 100
Somers, NY 10589

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[1] Based on published SPEC industry benchmarks SPECint_rate2006 and SPECfp_rate2006 comparing a Power E880 (64-core, 4.35 GHz) vs. systems using Intel Xeon E7-8890 v3, as of January 15, 2016

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