IBM LinuxONE Emperor II

Highlights

- The world's premier system for secure, scalable data serving

- Foundational capabilities for next-generation Open Source applications

- Unmatched security capabilities and pervasive encryption to protect clients from external and internal threats

- The best of enterprise service agility for private, hybrid, or public cloud integration with improved IT economics

- Improved performance and vertical scale within a single footprint with more cores, memory, and enhanced accelerators

Commonly referred to as the oil of our era, data has become the new global currency. The world is experiencing a time of exponential growth in the sheer volumes of data, fueled by the digital transformation of systems, services, and interconnected devices that all require strong data serving capabilities. Businesses must be able to manage, store, and protect this information, and, most important, use it for competitive advantage. This is creating the demand to apply intelligence and insight to the data to build new services and customized user experiences. Technology must create an environment where users have confidence that data is protected yet available from anywhere and any device. This ability to be fast and flexible in delivery of new services, with insight and security, will differentiate a business.

The IBM® LinuxONE Emperor II™ (Emperor II) provides unique capabilities to help with that differentiation. IBM LinuxONE™ is an all-Linux enterprise platform for open innovation that combines the best of Linux and open technology with the best of enterprise computing in ONE platform. It delivers a single system built on the industry's fastest commercially available processor and is built to be the backbone of the interconnected data-driven era, setting new standards in transaction volume, speed, and trust. The newest member of the IBM LinuxONE family, Emperor II, was designed to thoroughly protect the new global currency with speed and agility while delivering differentiated value to protect investments, reduce cost, and enable business growth. By providing a highly securable, massively scalable, data serving platform, Emperor II can help any business looking to thrive in a data-centric economy.

Unmatched performance, vertical scale

Emperor II provides an enterprise Linux infrastructure to meet the demands of a digital business. It is available with up to 170 configurable cores using the world's fastest commercial processor for impressive performance and massive scaling. It can support thousands of virtual servers on a single footprint with no database sharding or distributed server farms required. This means that the virtualization capabilities in a single Emperor II system result in a less complex infrastructure with fewer components, less management, less space requirements, and less software costs than x86 servers. With capacity to do the work of thousands of x86 servers, Emperor II has the ability to offer a 3-year running cost below x86.[1] Massive memory and I/O bandwidth support fast in-memory workloads and real-time analytics that bring more insights and new business value.

Capable of starting thousands of virtual servers in minutes, Emperor II provides unrivaled performance and vertical scale to support larger workloads with less latency and less admin complexity. It allows you to share and over-commit system resources to meet your client expectations. This unique vertical scale allows Emperor II to scale up to two million Docker containers in a single system and move data faster than alternative platforms with 2.1x higher data processing throughput. It can serve up to 30 billion web data requests a day and has the ability to host 20x larger databases without the added cost and latency of fragmenting data across server farms.[1] There are 640 additional processors that are not part of the general processor count. These additional processors are dedicated to I/O processing to increase I/O speeds and assure data integrity, and do not contribute to software licensing costs. On x86 this work is done with standard processors that drive incremental hardware, software, and administrative costs. Emperor II is the only Linux® system that offers this built-in, fast I/O subsystem capable of over 190 k 8 k read IOPs per FCP link.

With 32 TB of real memory, Emperor II can open opportunities such as in-memory data marts, large buffer pools for data access, and in-memory analytics while giving you the necessary room to tune applications for optimal performance. More data in-memory means more efficient, cost-effective vertical scaling while maintaining a single source of the truth. Advancements in the machine instruction set of the processor help accelerate analytic workloads by exploiting the Vector Packed Decimal Facility allowing packed decimal operations to be performed in registers rather than memory. Java™ improvements such as pause-less garbage collection enables vertical scaling while maintaining predictable results. The use of crypto acceleration delivers additional improvements in throughput per core, providing a boost to Java processes that use cryptographic

functions. Built to run at processor utilization rates as high as 100 percent, Emperor II will scale capacity on demand and ease the management of your Linux infrastructure through ONE powerhouse system.

Powerful security, digital trust

With best-in-class security features such as EAL 5+ isolation and cryptographic key protection, the security capabilities of Emperor II are unmatched in the industry. Within a single footprint, Emperor II is designed to avoid or instantly recover from failures to minimize business disruptions. High availability is realized through component reliability, redundancy, and features that assist in providing fault avoidance and tolerance, as well as permitting concurrent maintenance. EAL5+ is a regulatory certification for logical partitions (LPARs) verifying separation of partitions to improve security. This means you can run many virtual servers concurrently, leveraging Emperor II's ability to isolate and protect each virtual server, as if they were running on physically separated servers.

At the heart of every enterprise is core business data, assets which if lost or compromised could cause irreparable damage. This data is often governed by regulatory requirements designed to protect and safeguard privacy, with high penalties in the event of loss or inadvertent disclosure. Internal and external pressures to protect customer data have changed the perspective around how core business data should be protected. Establishing a "perimeter" around core data using encryption is one of the most impactful ways to protect data and prevent against loss. The Emperor II platform provides pervasive encryption capabilities designed to guard data more efficiently, without requiring application changes, making it a smart choice for data protection.

Emperor II provides privacy for transactions and sensitive data by employing a dedicated cryptographic coprocessor. The CP Assist for Cryptographic Function (CPACF), delivers cryptographic and hashing capabilities in support of clear-key operations. Exclusive to CPACF is the protected key support which provides the speed of processor-based cryptography while keeping keys private. The new Crypto Express6S feature is used to create the fortified data perimeter by leveraging the unique IBM Z® protected key CPACF in which the keys used in the encryption process are not visible to the applications and operating system in clear text form. Galois Counter Mode (GCM) is a new feature of CPACF. The use of protected keys with GCM[2] technology protects data without giving up performance, creating industry-leading secure Java performance via SSL that is 2 to 3 times faster than x86 alternatives.

An IBM exclusive, Secure Service Containers build upon the industry-leading isolation of IBM's logical partitions, providing a virtual lock box for each workload. The reason—even with the highest levels of peer isolation, organizations realize they also need vertical isolation to protect sensitive data from administrative staff who manage the infrastructure. By restricting system administrator access to the container, this technology protects against the misuse of privileged user credentials.

Next gen apps, enterprise service

Emperor II provides an impressive platform for all kinds of workloads, especially those that require high levels of availability, security or scalability. When your IT infrastructure needs to be expanded, the efficiency, flexibility and qualities of Emperor II are best in class. Its design allows you to grow capacity inside the server—on the fly—without affecting the running environment. It can support exponential growth with up to 170 cores and up to 85 logical partitions for secured workload isolation,

and HiperSockets™ for high speed internal partition-to-partition communications. Scaling within a single server helps eliminate the need to constantly buy, configure, and manage new services to handle growth. Emperor II also supports 32 TB of memory, which can provide impressive response time for in-memory applications as well as provide support for richer transactional analytics.

As a shared, immutable ledger for recording transactions, Blockchain is a revolutionary technology. It allows all members of a supply chain to share a digital ledger that is updated every time a transaction occurs. Members can view ledger progress in a common, transparent, and accessible record. Cryptographically enforced privacy ensures that members only see the parts of the ledger relevant to them, and that transactions are secure, authenticated, and verifiable. Businesses and customers around the globe need to interface with each other to exchange assets such as currency, services, and information. Experts believe that Blockchain will do for transactions what the Internet did for information. As a platform designed for

secure, data-serving workloads, IBM chose Emperor to run the IBM Blockchain High Security Business Network (HSBN). This and other key offerings, such as IBM's Database as a Service, are built on the Emperor platform, illustrating the power and confidence of the platform.

Open Source technology is driving the future and IBM is leading the charge with continued investment in the Linux ecosystem. Emperor II provides a unique platform for any Linux solution requiring high availability, security, or scalability and supports a wealth of new open source products such as Go, Python, Scala, Node.js, Docker, Spark, MongoDB, PostgreSQL, and MariaDB. Emperor II allows clients to take advantage of transformative technologies like Blockchain, gain cognitive insights through the use of Spark analytics, scale vertically with unmatched speed, provide highly-secure data serving capabilities, and leverage the use of application programming interfaces (APIs) to help create and deliver innovative, new customer services.

IBM LinuxONE Emperor II at a glance

Emperor II Models	Cores: Minimum* – Maximum	Memory: Minimum – Maximum
LM1	1 – 33	256 GB – 8 TB[†]
LM2	1 – 69	256 GB – 16 TB
LM3	1 – 105	256 GB – 24 TB
LM4	1 – 141	256 GB – 32 TB
LM5	1 – 170	256 GB – 32 TB
Cryptography		
Crypto Express6S	Minimum 2 features; Maximum 16 features	
Crypto Express5S	Minimum 2 features; Maximum 16 features	
Disk Connectivity		
FICON® Express16S+/FICON Express16S/FICON Express8S	Maximum: 320 ports	

IBM LinuxONE Emperor II at a glance		
NIC – Connectivity		
10GbE RoCE Express2	Maximum 8; Minimum recommended: 2	
OSA-Express6S	Maximum: 96 ports	
OSA-Express5S	Maximum: 96 ports	
High Speed "Virtual" LANS		
HiperSockets	Up to 32 connections	
Supported Linux distributors		
Red Hat	Red Hat Enterprise Linux (RHEL) 6, and 7	
SUSE	SUSE Linux Enterprise Server (SLES) 11 and 12	
Canonical	Ubuntu 16.04 LTS	
Supported Hypervisors		
IBM z/VM®	z/VM 6.3, z/VM 6.4	
KVM	KVM hypervisor which is offered with the following Linux distributions: SLES-12 SP2 or higher, and Ubuntu 16.04 or higher	
IBM partitioning technology	Up to 85 LPARs for secure workload isolation	
Typical Physical Weight of Air Cooled Configuration[‡]	Minimum configuration weight of new build LM1[‡]	Maximum configuration weight of new build LM5[‡]
With Internal Battery Feature (IBF)	LM1 3219 lbs (1461 kg) With overhead cabling 3375 lbs (1531 kg)	LM5 5961 lbs (2705 kg) With overhead cabling 6117 lbs (2775 kg)
Without Internal Battery Feature (IBF)	LM1 2772 lbs (1258 kg) With overhead cabling 2928 lbs (1328 kg)	LM5 5290 lbs (2400 kg) With overhead cabling 5446 lbs (2471 kg)
Product Dimensions (D x W x H) without overhead cabling	73.5 x 61.6 x 79.3 inches (186.7 x 156.5 x 201.3 cm)	
Product Dimensions (D x W x H) with overhead cabling	73.5 x 72.7 x 84.8 inches (186.7 x 184.7 x 215.3 cm)	
Airflow (Capacity of Exhaust)	6370 cubic meters / hour (3800 CFM)	

Why IBM?

IBM has been committed to Linux since 1999. As you transform your business and differentiate yourself in a trust economy, IBM remains your partner. We have the total expertise—in systems, software, delivery and financing—to help you create a secure, open, and intelligent foundation for the future. Our experts can help you configure, design and implement a solution optimized for the needs of your business.

For more information

Contact your IBM representative or IBM Business Partner, or visit:

ibm.com/systems/linuxone/enterprise-linux-systems/emperorll.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

[1] Performance comparison based on IBM Internal tests comparing Emperor cloud with one comparably configured private x86 cloud and one comparably configured public cloud running an aggregation of light, medium and heavy workloads designed to replicate typical IBM customer workload usage in the marketplace. System configurations are based on equivalence ratios derived from IBM internal studies and are as follows: Public Cloud configuration: total of 219 instances (128 for light workloads, 64 for medium workloads and 27 for heavy workloads); x86 Cloud configuration: total of eleven x86 systems each with 24 Intel E7-8857 v2 3.0GHz cores, 512 GB memory, and 7x400 GB SSDs; Emperor Cloud configuration: total of 32 Linux cores, 3806 GB memory, and Storwize v7000 with 47x400 GB SSDs. Price comparison estimates based on a 3YR Total Cost of Ownership (TCO) using publicly available U.S. prices (including a 20 percent discount for middleware) current as of January 1, 2015. Public Cloud TCO estimate includes costs (US East Region) of infrastructure (instances, data out, storage, support, free tier/reserved tier discounts), middleware and labor. Emperor and x86 TCO estimates include costs of infrastructure (system, memory, storage, virtualization, OS, cloud management), middleware, power, floor space and labor. Results may vary based on actual workloads, system configurations, customer applications, and other environment variables. Users should verify applicable data for their specific environment.

[2] Performance results based on IBM internal tests running DayTrader 3 with WebSphere Liberty 8.5.5.9 using SSL clear key and TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 cipher.

* Ordering an IBM LinuxONE Emperor II with Elastic Pricing the minimum Linux cores must be six (6), independent of the model that is purchased.

† Provides the minimum physical memory required to hold base purchase memory plus 96 GB HSA

‡ The Power® Estimator tool includes weight data and has the capability to provide a more accurate weight for your particular configuration. Log on to Resource Link at http://www.ibm.com/servers/resourcelink. Navigate to Tools, then to Power and weight estimation. Specify the quantity for the features that are installed in your machine. This tool estimates the power consumption for the specified configuration.

Please Recycle

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