
IBM Z
January 2020

Linux on IBM Z

Frequently Asked Questions

Worldwide



ZSQ03011-USEN-44

Table of Contents

- Linux on IBM z15 3
- Why Linux on IBM Z? 6
- Software and Solutions 12
- IBM Z Virtualization Technologies..... 17
- IBM Integrated Facility for Linux (IFL)..... 22
- IBM Storage solutions 24
- Support, Services, and Education..... 25
- Resources..... 26

Linux on IBM z15

What are the advantages of IBM z15™ (z15) for running Linux?

The z15 is focused on delivering a system designed for secure digital transformation. The z15 can help to keep services and operations running smoothly and continuously, on-premises or in the cloud. The z15 extends pervasive encryption beyond the border of the IBM Z® environment with a goal of protecting data beyond the platform and into distributed and hybrid cloud environments. Linux® workloads¹ will support and benefit from the strengths of z15:

- z15 is designed to provide the infrastructure to meet the demands of a digital business, with performance and scaling advantage over prior generations, delivering an increase in I/O rates, improved virtualization performance, advanced analytics processing, and simplified operations, while giving necessary room to tune applications for optimal performance.
- z15 continues of implementing acceleration directly onto the chip with the new IBM Integrated Accelerator for z Enterprise Data Compression (zEDC). The Integrated Accelerator for zEDC can enable the reduction in the size of data to save storage space and also increase data transfer rates, with reduced CPU consumption.
- z15 and the new offering, IBM Z Data Privacy Passports², will provide individual access to data is managed by policy at the field level without requiring application changes. Not only can Z be the trustful authority to protect and manage the data throughout your environment, but it also introduces this concept of privacy as well.
- z15 is designed with pervasive encryption delivering a transparent and consumable approach that enables extensive encryption of data in flight and at rest, delivered via the improved on-processor cryptography and the new Crypto Express7S crypto adapter.
- z15 further strengths the unparalleled resiliency of IBM Z through innovations, including optimized throughput, higher server hardware reliability, faster recovery if failures occur, reduced I/O latency to storage, react faster to workload fluctuations, and improved workload scaling.
- IBM Fibre Channel Endpoint Security, providing the assurance that data that is flowing within and across datacenters is traveling between trusted entities.

What is pervasive encryption with Linux on IBM z15?

Pervasive encryption for Linux on z15 and other IBM Z servers is transparent to existing applications and targeted to improve the usability and performance of encrypting/decrypting data in-flight and at-rest, leveraging the improved on-processor Central Processor Assist Crypto Functions (CPACF) and the new Crypto Express7S accelerator¹.

Encryption support is an integral part of the Linux operating system. The concept with Linux for Z is providing differentiation without being different. This is accomplished by integrating exploitation of the Z encryption hardware (CPACF, Crypto Express, true random number generator) into strategic components of the stack. The encryption functions are integrated in Linux kernel, openssl,

¹ IBM is working with the Linux distribution partners to support the new z15 functionality in upcoming Linux for IBM Z releases.

² IBM Z Data Privacy Passports will be available via an IBM z15 only PID. For more information: V1.0 beta program announced on September 12, 2019 refer to Software Announcement 219-452.

openCryptoki, GSKIT, and Java™ 8/JCE, and the ‘protected key’ support is integrated into the Linux kernel and infrastructure.

A premier goal of pervasive encryption is to leverage the Z hardware acceleration in a way that is transparent to the applications and is highly consumable. Clients don’t have to change their encryption approach, they simply get consumable data protection for data in-flight and data at-rest.

Linux encryption for data in-flight: Linux is well equipped for encrypting all data in-flight using protocols like TLS, IPsec, or SSH. Exploiting the excellent cryptographic performance of the z15, Linux users can afford to pervasively encrypt their network traffic in a transparent manner using OpenSSL, OpenSSH, and IPsec.

In addition, the on-chip true random number generator allows to generate irreproducible unique data which is the basis to generate high quality cryptographic keys.

Linux encryption of Data-at-rest: Recent Linux kernels support end-to-end encryption of block devices (e.g. disk partitions, logical volumes) with dm-crypt using the CPACF protected key technology via the standard LUKS2 format.

IBM Fibre Channel Endpoint Security, along with IBM Z Data Privacy Passports, is designed to contribute to the IBM Z approach of encryption everywhere. It is a new end-to-end solution that helps ensure all corporate and client data is accessed only by trusted servers and storage devices, and the integrity and confidentiality of the data are protected as it is exchanged over Fibre Channel links.

To learn more see the video [Pervasive Encryption for Data Volumes \(4:58\)](#), read the documentation [Pervasive Encryption for Data Volumes \(PDF, 9.6MB\)](#) , or see the video [Setting up Data Volumes for Pervasive Encryption – In less than ten minutes \(7:20\)](#).

Note: Pervasive encryption is not a feature that you can switch on or off.

What are the advantages in performance and scaling for Linux running on z15?

The z15 performance and scaling advantages are based on faster IBM Facility for Linux (IFL) engines, on-chop accelerated compression, new instructions, and the overall increased Linux capacity. Every Linux workload will benefit transparently, approximately 14%³ increase in performance over the previous IBM Z generation is expected with some variation, based on workload and configuration.

- z15 will have up to 190 client configurable cores.
- z15 single thread performance improvement will be approximately 14%³.
- z15 will have a redesigned cache architecture³. This further and helps to avoid untimely swaps and memory waits while maximizing the throughput of concurrent Linux workloads.
- z15 cores will provide on-chip IBM Integrated Accelerator for zEDC with up to 15 times more compression throughput^{1,3}.
- z15 will have up to 40 TB of Redundant Array of Independent Memory (RAIM) memory.
- z15 will include over 30 new instructions co-designed and exploited by Java. These improvements will help to absorb large application and transaction spikes.

³ Over the previous IBM Z generation.

z15 provides greater workload compute capacity, resulting in approximately 25% more total capacity in a single footprint³.

Based on this immense capacity inside a single physical server, the z15 models provides the scalability to securely support the digital engagement – helping to handle the amount of workload generated by of cloud, analytics and all other applications.

What are the advantages of running Linux side-by-side with z/OS on z15?

The co-location of Linux side-by-side with IBM z/OS® or IBM z/VSE®, or IBM z/TPF on any IBM Z server provides the unique opportunity to connect ‘systems of record’ and ‘systems of interaction’ on one system, thereby benefiting in performance and operational efficiency. With the immense capacity improvements of z15, all environments, Linux and z/OS, z/VSE or z/TPF, can be expanded at the same time without the need to add an additional server.

The performance benefits are based on the optimized, internal communication between the workloads:

- Large cache sizes allow for efficient data serving with minimal latency, the elimination of network traffic handling, and high I/O bandwidth provides impressive throughput.
- Technologies such as HiperSockets™ or Shared Memory Communication further improve internal communication.

Operational efficiency is based on the streamlined infrastructure with less components:

- The co-location allows for a centralized management of the workloads, things such as security identity or disaster recovery can be done by an all-encompassing solution.
- The co-location allows for a smaller network infrastructure (firewalls, routers, switches, etc.) with fewer points of attack that need to be secured, and thus improving the level of security.
- When the IT capacity needs to be expanded, an IBM Z server can grow the by simply adding system resources into the existing server, on the fly, without affecting the business.

What are the certified and IBM tested Linux distributions running on z15?

Certified Linux distributions from Canonical, Red Hat, and SUSE support all z15 and IBM LinuxONE™ servers. IBM is working with the Linux distribution partners to support the new z15 functionality in their upcoming Linux releases for IBM Z.

The certification statements of the distribution partners and the IBM tested levels are shown at the “Tested Platforms” web page: ibm.com/it-infrastructure/z/os/linux-tested-platforms

Why Linux on IBM Z?

What makes Linux on IBM Z an efficient Linux and on-premises Cloud infrastructure?

Linux on Z demonstrates a perfect infrastructure for all kind of Linux solutions and cloud services. It is designed for:

- Maximum scalability to enable you to exceed customer expectations,
- High security levels with pervasive encryption for consumable data protection and ultimate security inside the server (EAL5+ certification),
- Resilience and continuous availability without risk of downtime, providing high levels of security and governance,
- Great agility and portability through integrated tooling for cloud-native development,
- Open APIs to unleash and amplify core assets,
- Efficient operations with rapid deployment, configuration, and management of virtual Linux servers.

Enterprises can maintain on-premises control of both, new and existing IT assets, to meet their needs on security, SLAs, privacy, compliance and regulatory requirements. The Linux on Z infrastructure allows for rapid innovation and expansion of new services, which can be connected and integrated with the existing assets on IBM Z—therefore providing an excellent infrastructure for on-premises cloud services.

Impressive scalability—horizontal and vertical—is provided with the IBM Z capabilities in combination with the virtualization technologies. Resources can be assigned dynamically and efficiently between workloads, whenever and wherever they are needed.

With Linux on IBM Z you can transform your IBM Z, Linux and cloud environments into a secure, private on-premises cloud environment. Integrating DevOps capabilities with cloud optimized software, allowing your teams to take advantage of IBM software via containers and microservices. In addition, through IBM's public cloud, you may take advantage of IBM Z's security services as part of your hybrid cloud.

Containers can be deployed via IBM Cloud Pak™ for Applications, IBM Private Cloud, Docker, and other container technologies. IBM announced plans⁴ to bring Red Hat OpenShift and IBM Cloud Paks to the IBM Z enterprise platforms.

IBM Z allows for fast internal communication, and with Shared Memory Communication between Linux and z/OS, you can get even faster performance while saving compute power. Co-locating data and applications on IBM Z also supports efficiency, allowing for data serving with minimal latency, elimination of network handling, and centralized management.

Pervasive encryption with Linux on IBM Z servers is transparent to existing applications and targeted to improve the usability and performance of encrypting/decrypting data in-flight and at-rest, leveraging the CPACF and the Crypto Express accelerators.

⁴ Please see: ibm.co/20AtVko

The new IBM Z Data Privacy Passports is being designed to enforce security and privacy protections to data not only on Z, but across platforms. It provides a data-centric security solution that enables data to play an active role in its own protection.

“Linux is Linux” and Linux on IBM Z can provide a highly efficient on-premises Linux and cloud infrastructure as part of your open hybrid multicloud platform with common services, and multi-cluster management at its core.

What are the key differentiating benefits of Linux on IBM Z?

- Highly efficient operations for new and existing services
- Reduced risk with outstanding protection and high availability
- Security and data protection with pervasive encryption
- Impressive scalability, horizontal and vertical, in combination with virtualization technologies
- Predictable cost and long-term cost-effectiveness
- Maximized return on existing IT investments

What are the detailed benefits of Linux on IBM Z?

- Highly Efficient Operation
 - Outstanding scalability, horizontal and vertical, based on the immense total IBM Z capacity and virtualization technologies
 - Growth inside the server, grow resources on the fly without disruption
 - Low operational effort based on centralized management for new and existing services, for example for backup and disaster recovery
 - Easy manageable through intuitive tools and open APIs
 - Less IT equipment requires less maintenance
 - Streamlined infrastructure with fewer equipment allows for fast configuration changes – if required
- Outstanding security
 - Pervasive encryption enablement with hardware accelerated encryption for high performance
 - Dedicated cryptographic coprocessor on each core provides hardware accelerated encryption of CPACF¹
 - New Crypto Express7S accelerator¹
 - End-to-end encryption of block devices (e.g. disk partitions, logical volumes) with dm-crypt using the CPACF protected key technology supporting the LUKS2 format
 - Generate irreproducible unique data, which is the basis to generate high quality cryptographic keys, with new on-chip true random number generator
 - EAL 5+ hardware security certification provides isolation and protection of Linux, IBM z/VM®, KVM, z/OS, z/VSE and z/TPF environments
 - IBM Z is the world’s only commercial servers with an EAL 5+ hardware security certification
 - IBM RACF® Security Server for z/VM as the backbone for Linux security provides security systems that includes access control and auditing functionality
 - Fewer network components (routers, switches, etc.) reduce security risks
 - IBM Secure Service Containers for software appliances which cannot be inspected by system administrators

- Resilience, High Availability and Business Continuity
 - IBM Z servers are designed to avoid or recover from failures to minimize business disruptions – even in a single footprint through error prevention, error detection and correction, and error recovery
 - IBM Z servers provide spare cores for transparent failover, and the RAIM memory subsystem helps to eliminate failures (RAIM = redundant array of independent memory)
 - z/VM Single System Image (SSI) feature supports simple systems management, non-disruptive maintenance, and concurrent support for virtual machines.
 - All-encompassing Disaster Recovery solution with IBM GDPS® allows for multiplatform resiliency capabilities for native Linux, Linux guests under z/VM or KVM, and z/OS
 - Advanced clustering technologies, dynamic file system management, and data replication available with IBM Spectrum Scale™
- High performance
 - IBM Z processors have large and fast caches avoiding untimely swaps and memory waits while maximizing the throughput of concurrent workloads
 - On-chip accelerated compression for reduction in the size of data to save storage space and for increasing data transfer rates¹
 - Simultaneous Multithreading (SMT) with high efficiency based on thread/resource balancing, performance optimized key virtualization, etc.
 - Single instruction, multiple data (SIMD) provides reduced processor quiesce effects, lower cache misses, lower pipeline disruption, and an increased parallelism
 - Pause-less garbage collection to enable Java applications to run faster
 - Low latency, high throughput, and low external network traffic delivered by cross-memory data transfer
 - Shared Memory Communication (SMC) helps to reducing the processor consumption and improves latency and throughput for network communication
 - High I/O bandwidth throughput with FICON Express16SA, FICON Express16S+, OSA-Express7S GbE, 10GbE, 1000Base-T, and 25GbE SR1.1.
- Predictable cost and long-term cost-effectiveness
 - *See next question, 'What are the potential cost savings of using Linux on Z?'*

What are the potential cost savings of using Linux on IBM Z?

Linux on Z can help lower your IT costs in several areas. The potential areas of cost savings are:

- Business continuity – Linux on Z provides trusted operations, it can scale up and out to meet spikes in server activity, helping to minimize costly transaction delays and potentially devastating system crashes. IBM Z is continuously strengthening its unparalleled resiliency through innovations. The suite of the IBM Z built-in features can rapidly respond to, or even anticipate, threats to system health, helping to prevent costly system downtime. As well, high availability and disaster recovery solutions, such as z/VM SSI, IBM Spectrum Scale, or IBM GDPS solutions enhance the platform capabilities.
- Security – Linux on Z leverages the most secure commercial servers available, with powerful encryption—protecting data 24/7, and help to achieve compliance and meet regulatory objectives. IBM Z is enabling the world of pervasive encryption for Linux. Transparent exploitation of the fast encryption is given to the Linux workloads. Clients don't have to change their current encryption approach, they simply can get consumable data protection for data in-

flight and data at-rest. IBM Secure Service Containers for software appliances which cannot be inspected by system administrators.

- Operational management – a single IBM Z server, running up to thousands of virtual Linux servers, can mean less effort for the systems and operational management. Think of all servers, cables, switches, routers that won't be required with a single server environment. In addition, an intelligent virtualization management can help you on your productivity. Co-locating Linux side-by-side with z/OS, z/VSE or z/TPF on the same IBM Z server can benefit from the fast, internal network communication, resource sharing, and an all-encompassing high availability solution with unique arrangements for administration, security, backup and disaster recovery.
- Workload integration and co-location – integrating Linux workloads with solutions running on z/OS or z/VSE or z/TPF on the same IBM Z server can not only benefit from the fast communication and operational efficiencies, but as well with the API economy, the existing business competencies can be used in new ways, delivering services into next generation applications accessible via services. The support of standards such as Web Services and REST with JSON is important to make it easier to build new applications. In addition, with Red Hat OpenShift and IBM Cloud Paks you can harness from the scalability and security of IBM Z alongside the flexibility to run, build, manage and modernize cloud-native workloads on your choice of architecture.
- Software licensing – Linux on Z can support the consolidation of multiple x86 cores onto a single IBM Z core. This can result in a dramatic cost reduction since software licensing costs for Linux are usually priced per core.
- Maintenance – the maintenance costs of a single IBM Z server can replace the maintenance costs of many x86 servers. As well, it's not only the server maintenance, the maintenance of all the network components which aren't required with a single server environment, is omitted as well.
- Energy and space consumption – Linux on an IBM Z server can allow for fewer servers and network components, which can help on savings in physical space and electricity consumption.

These areas are mainly based on IBM Z server technologies, they allow for:

- Reliability, availability, and serviceability (RAS) and additional compute power through coprocessors for I/O and RAS
- High security levels with CPACF, Crypto Express7S accelerator, and IBM Secure Service Container technology
- High resource utilization, helping to save software costs when priced per core
- High performance and throughput per core through SMT, SIMD, and cache design
- In-memory analytics through large memory and large caches
- Low cost per workload based on high processing capacity in a single footprint

Is Shared Memory Communication supported on Linux on IBM Z?

Yes, the shared memory communication (SMC) protocol is an addition to TCP/IP and can be used transparently. The SMC protocol can be used for connections through:

- Shared Memory Communications through RDMA (SMC-R) with RoCE devices
- Shared Memory Communications Direct (SMC-D) with ISM devices

SMC-D uses Internal Shared Memory (ISM) technology within the Z system. It does not require any additional physical hardware (adapters, card slots, switches, PCI infrastructure, etc.). SMC-R uses sockets over RDMA (Remote Direct Memory Access) communications protocol. It provides host-to-host direct memory communications w/o significant TCP/IP processing costs. Learn more: [SMC for Linux on IBM Z](#)

Does SMC-D replace HiperSockets?

No, SMC-D supplements HiperSockets, just like SMC-R supplements traditional TCP connections. The major reasons for that are:

- SMC supports TCP only - not UDP
- The initial setup of each connection always requires traditional connectivity. Even if both peers support SMC-D and/or SMC-R, there is always the possibility that a connection using SMC-D/R cannot be established, and traditional connectivity will be used instead.

Learn more: [Linux on Z SMC FAQ](#)

Does Linux support IBM Integrated Accelerator for z Enterprise Data Compression on z15?

Yes, Linux will support the IBM Integrated Accelerator for zEDC¹, offering a compression acceleration solution designed for high performance, industry standard, and low latency compression.

Linux workloads, independent of the virtualized environment, can benefit for the Integrated Accelerator for zEDC; it will be most beneficial for workloads such as:

- Java (e.g. IBM WebSphere® Application Server)
- Backup (e.g. for DBs)
- Network traffic (e.g. Apache, NGINX)
- IBM MQ

What is Linux on IBM Z?

‘Linux on IBM Z’ is the synonym for Linux that has been ported to the IBM Z architectures listed below.

Linux for Z is supporting devices that are specific to the IBM Z environment, and it is optimized to exploit the IBM Z architecture for scalability, performance, security, and resiliency—distinguishing Linux on Z from Linux on other platforms.

Linux has been ported to the following IBM Z servers:

- IBM z15 (z15)
- IBM z14® (z14) all models
- IBM z13® (z13) and IBM z13s® (z13s)
- IBM zEnterprise® EC12 (zEC12) and IBM zEnterprise BC12 (zBC12)
- IBM zEnterprise 196 (z196) and IBM zEnterprise 114 (z114)
- IBM System z10® Enterprise Class (z10 EC™) and IBM System z10 Business Class™ (z10 BC™).

Using ‘Linux on Z’ refers to Linux running on any IBM Z server, versus for example using ‘Linux on z15’ is referring to Linux running on z15 specifically.

Where can I get commercial Linux distributions for IBM Z?

Commercial distributions are available from the IBM Linux distribution partners: Canonical, Red Hat, and SUSE.

- Red Hat: www.redhat.com/en/store/red-hat-enterprise-linux-ibm-system-z
- SUSE: www.suse.com/products/systemz
- Ubuntu: www.ubuntu.com/server

IBM suggests that these distributions be your first choice for production environments because of their availability of service and support from the Linux distributors partners and IBM Support Line.

Is IBM working together with the Linux Foundation on Linux for IBM Z?

Yes, the Linux Foundation has established an Open Mainframe Project for vendors, users, and academia to work together to advance Linux tools and technologies for enterprise innovation. The Open Mainframe Project is intended to serve as a focal point for deployment and use of the Linux OS in a mainframe computing environment. More information is available at www.openmainframeproject.org

Where do I find more information about Linux on IBM Z?

You can ask your IBM or Business Partner representative, or look at the web page

- “Linux on IBM Z” at: ibm.com/it-infrastructure/z/linux
- and the blogs: “Linux and Mainframe” linux.mainframe.blog , linux-on-z.blogspot, Containers on Z, and KVM on Z.

Software and Solutions

Which IBM software products are available for Linux on IBM Z?

IBM offers a large software portfolio. The available IBM software products for the Linux distributions for Z can be listed via the [IBM Software Product Compatibility tool](#).

As 'Platform' select 'Linux',

as 'Name' select *exactly* one of the following entries (*only these show results for Linux on Z*):

- for RHEL 8:
[Red Hat Enterprise Linux \(RHEL\)](#)
- for RHEL 7 and RHEL 6:
[Red Hat Enterprise Linux \(RHEL\) Server](#)
- [SUSE Linux Enterprise Server \(SLES\)](#)
- [Ubuntu](#)

as 'Hardware' select 'IBM Z' (IBM z Systems),
select 'Version' from displayed 'Search results',
and 'Submit' the request.

The screenshot shows a search form with the following fields and values:

- Platform:** Linux
- Name:** Select one:
- Edition:** (empty)
- Version:** (empty)
- Hardware:** IBM z Systems
- Search results:** (empty)
- Submit** button

(<http://publib.boulder.ibm.com/infocenter/prodguid/v1r0/clarity/productsOnOs.html>)

You can use the following pre-defined search entries:

- [Red Hat Enterprise Linux 8](#)
- [Red Hat Enterprise Linux 7](#)
- [Red Hat Enterprise Linux 6](#)
- [SUSE Linux Enterprise Server 15](#)
- [SUSE Linux Enterprise Server 12](#)
- [SUSE Linux Enterprise Server 11](#)
- [Ubuntu 18.04](#)
- [Ubuntu 16.04](#)

Which open source software can be used with Linux on IBM Z?

Linux on Z provides you the choice and flexibility to select from the growing ecosystem of open source software for building your business applications. Most current information about the open source software packages that have been validated for Linux on Z can be found at:

ibm.com/developerworks/community/forums/html/topic?id=5dee144a-7c64-4bfe-884f-751d6308dbdf

We also invite you to also join the community at:

ibm.com/developerworks/community/groups/community/lozopensource

Where can Independent Software Vendor (ISV) products found?

You can also ask your IBM or Business Partner representative, or look at the following resources:

- IBM Global Solutions Directory: www-304.ibm.com/partnerworld/gsd/homepage.do
- [Red Hat product catalog - search page](#)
- [SUSE partner software catalog for Z](#)
- [Ubuntu software partners](#)

What are “best fit” solutions to be used with Linux on IBM Z?

Linux solutions requiring high availability, security or scalability are best suited to run on IBM Z. In addition, clients with existing IBM Z environments are taking advantage of the co-location possibility of the Linux solutions with solution running on z/OS, z/VSE, and z/TPF in parallel. The “best fit” solutions and software products include:

Analytics

IBM Cognos® Business Intelligence combined with IBM Watson™ Explorer or IBM SPSS® provides a single, scalable infrastructure that helps simplify enterprise data access for reporting, analysis, dashboards, mobile apps, predictive analytics and much more. Running analytics co-located with your data warehouse and transactional systems on IBM Z allows for more timely, accurate and secure access to your information.

IBM Db2® Warehouse is a software-defined data warehouse for private clouds and virtual private clouds that support Docker container technology. It is optimized for fast and flexible deployment on your choice of hardware, with automated scaling to meet agile analytic workloads. It offers cloud elasticity combined with the simplicity of a software appliance. The real power of IBM Db2 Warehouse is the high performing, analytics engine that combines in-memory processing with in-database analytics across an MPP (massively parallel processing) architecture.

IBM Db2 with BLU Acceleration® is the next generation database technology that changes the game for in-memory computing. BLU Acceleration provides breakthrough performance by delivering instant insight from real-time operational data and historical data. It delivers this performance without the constraints of other in-memory solutions and with the simplicity of “load and go” setup.

IBM Db2 Analytics Accelerator for z/OS, V7.1 delivers two new deployment options on either the IBM Integrated Analytics System or directly on the new IBM Z mainframe, within IFL processors, and without the need to attach a separate appliance. Both deployment options are based on the premier IBM analytical engine, Db2 Warehouse software.

Apache Spark, Apache Solr, and Elasticsearch (ELK) are a few examples of the available open source products.

Data Management and Information Integration

The Linux on Z strengths in I/O throughput, scalability, and availability can be leveraged with the broad range of information management software, such as IBM DB2, Cloudant®, IBM Informix®, Db2 Connect™, Oracle Database, Apache CouchDB, MongoDB, and PostgreSQL.

The IBM InfoSphere® product family – for example: Information Server, Master Data Management – and Optim™ and Guardium® products, allow you to build comprehensive solutions to handle critical, information intensive business problems.

Db2 Connect provides connectivity to IBM Z databases from Linux. It is an industry-leading solution integrating enterprise data with client/server, web, mobile, and service-oriented architecture applications.

Blockchain

You can take advantage of the cryptography, security, and reliability of IBM Z for hosting your blockchain – while seamlessly integrating with the transactional data and systems already on IBM Z. Linux on IBM running Blockchain peer to peer nodes realize optimized communication on IBM Z and with z/OS. The blockchain deployment in an IBM Secure Service Container keeps ledgers separate and secure. Learn more: [Blockchain transactions on IBM Z](#)

Container technology

Containers can be deployed via IBM Cloud Paks, IBM Cloud Private, Docker, and other container technologies. IBM announced plans⁴ to bring Red Hat OpenShift and IBM Cloud Paks to the IBM Z enterprise platforms.

[IBM Cloud Paks](#) are enterprise-ready, containerized software solutions that give clients an open, faster and more secure way to move core business applications to any cloud. Each IBM Cloud Pak includes containerized IBM middleware and common software services for development and management, on top of a common integration layer – designed to reduce development time and operational expenses. [‘Cloud Pak for Applications V4.0’](#) is available and extends support for Red Hat OpenShift Container Platform 4.2 onto IBM Z.

The goal for Red Hat OpenShift for IBM Z will be to help clients enable greater agility and portability through integrated tooling and a feature-rich ecosystem for cloud-native development to deliver containerized applications that can scale vertically and horizontally, accelerate deployment and orchestration of containers with Kubernetes, and help IT to support rapid business growth.

[IBM Cloud Private on IBM Z and LinuxONE](#) provides a platform-as-a-service for private cloud that combines the agility and flexibility of public cloud with the control and security of an on-premises data center. The [IBM Secure Service Container for IBM Cloud Private](#) delivers pervasive encryption and data protection capabilities for hybrid and private cloud containerized workloads on Z servers. The offering help deliver a secure computing environment for microservices-based applications.

Docker started to simplify how to develop, package and run applications by using lightweight containers. Here a collection of examples to show how [Dockerfiles](#) could be created and used on Linux on Z.

Web Serving, Java- and Business Applications

Linux on Z is an excellent choice for clients to host web and all kind of Java or business applications. The IBM WebSphere family offers a great Java environment, and many independent software vendors, like SAP, offer their products as well. Some of the available open source software provides are: Apache HTTP, Apache jMeter, Apache Tomcat, Ceilometer, Drupal, HAProxy, JBoss, Magento, and NGiNX.

Mobile Computing

The capabilities of [IBM MobileFirst® Platform Foundation](#) and IBM WebSphere Portal can help organizations extend their business to mobile devices. MobileFirst Platform Foundation helps organizations extend their business to mobile devices. It provides an open and comprehensive platform to not only build, but test, run and manage native, hybrid and mobile web applications. With IBM Custom Patterns for Linux, middleware products including IBM MobileFirst Platform Foundation can be quickly provisioned. Node.js can be perfect in developing mobile apps, when your mobile backend mainly involves I/O tasks like requesting data from a database.

Platform Integration and Secure Messaging

Platform integration between large traditional systems to unmanned devices, messages to flow between different business applications, or a service-oriented architecture (SOA) implementation are also a great fit, based on [IBM Integration Bus](#) and [IBM MQ](#). The IBM Integration Bus provides connectivity and universal data transformation for SOA and non-SOA environments, and MQ facilitates a secure and reliable exchange of information between applications, systems, services and files. Examples of open source products are: Apache Kafka, Fluentd, Logstash, and RabbitMQ.

DevOps

The Linux on Z infrastructure can isolate multiple execution environments and allows an organization to leverage powerful DevOps capabilities to enable faster and more frequent deliveries of engaging mobile solutions.

IBM offers a complete multi-platform DevOps solution from idea capture through to solution delivery with the [IBM Rational® Collaborative Management Lifecycle \(CLM\)](#) solution. This means developers can build and test their applications for deployment on IBM Z servers. To complete the developer experience, CLM can be used with commercial or open source tools to provide the full Linux development environment.

[IBM Rational ClearCase®](#) offers an industry-leading management solution that provides sophisticated version control, workspace management, parallel development support, and build auditing to improve productivity. A few examples:

IBM Rational Team Concert® enables development teams to manage all aspects of their work, including planning, tracking, revision control, build automation, and reporting. It includes Scaled Agile Framework (SAFe) support for lean and agile development.

IBM Rational DOORS® is a requirements management application for optimizing requirements communication, collaboration, and verification.

[IBM Rational Application Developer for WebSphere](#) accelerates the development, quality assurance, and deployment of Java, Java EE, Web, mobile, portal and service-oriented architecture (SOA) applications.

IBM Rational Quality Manager is a collaborative hub for business-driven software and systems quality across virtually any platform and type of testing.

[IBM UrbanCode® Deploy](#) synchronizes, orchestrates and automates the deployment of applications, middleware configurations and database changes into development, test, and production environments.

The IBM SDK for Node.js provides a stand-alone JavaScript runtime and server-side JavaScript solution for IBM platforms. It provides a high-performance, highly scalable, event-driven environment with non-blocking I/O that is programmed with the familiar JavaScript programming language. The [IBM SDK for Node.js](#) is based on the Node.js open source project. It provides a compatible solution for IBM Z products that require Node.js functionality and package management.

In addition, with IBM's plans for Red Hat OpenShift on IBM Z, you will get the agility and portability through integrated tooling and a feature-rich ecosystem for cloud-native development.

Development languages such as C, Go, JavaScript, Python or Ruby, as well as many opens source products are available for Linux on Z such as Ansible, Elasticsearch, Kibana, Jenkins, Puppet, or Salt.

Asset Management, Business Process Management, and Enterprise Content Management

The [IBM Maximo® Asset Management](#) software unifies comprehensive asset life cycle and maintenance management on a single platform. Maximo software is used as a single point of management for every aspect of a wide range of services.

IBM Business Process Management software available for Linux on Z, such as the Business Process Manager provide visibility and insight to manage business processes.

The Enterprise Content Management solutions help companies realize the strategic value of content for better business insight and outcomes. Products, like FileNet® Content Manager, Content Manager, and Content Manager On Demand, deliver high value solutions that can help companies transform the way they do their business.

Is a cluster file system technology available for Linux on IBM Z?

Yes, IBM Spectrum Scale for Linux on IBM Z is available. It provides a high performance shared-disk file management solution, intended for fast, reliable access to data from multiple nodes in a cluster environment.

Spectrum Scale is designed to provide high availability through advanced clustering technologies, dynamic file system management, and data replication. Spectrum Scale can continue to provide data access even when the cluster experiences storage or node malfunctions. Its scalability and performance are designed to meet the needs of data intensive applications such as business intelligence or scalable file serving. Applications can transparently access files using standard file system interfaces.

See the detailed information in the [IBM Knowledge Center](#)

Does IBM offer an IBM GDPS solution for Linux on IBM Z?

Yes, in form of the IBM GDPS/PPRC (*Peer-To-Peer Remote Copy*) Multiplatform Resiliency for IBM Z (also known as xDR). It provides disaster and failure recovery from a single point of control and ensures data consistency across multiple sites. GDPS/PPRC is the variant of GDPS that performs synchronous data replication using IBM Metro Mirror (aka PPRC) technology.

More information is available at: [IBM GDPS](#) is described in the Redbook: [IBM GDPS Family of Products: An Introduction to Concepts and Capabilities](#).

IBM Z Virtualization Technologies

What is IBM Z virtualization technology?

IBM Z virtualization technology allows clients to create virtual processors, communications, memory, I/O, and networking resources, thus helping to reduce the overhead of planning, purchasing and installing hardware to consolidate and support new workloads.

The virtualization technology for IBM Z platforms is composed of a hardware and a hypervisor or container virtualization (z/VM, KVM, container technology). Important, IBM Z virtualization is not an afterthought; it is designed in from the bottom up.

More information is available at: ibm.com/it-infrastructure/z/capabilities/virtualization

Which hypervisors and virtualization technologies are available on IBM Z?

- IBM Processor Resource/System Manager (PR/SM™) or via Dynamic Partition Manager (DPM)
 - Firmware based virtualization to securely share and partition hardware resources.
- IBM Secure Service Container: A partition for specialized containers, fully encrypted, with limited and encrypted network access and no access for system administrators.
- IBM z/VM: IBM software mainframe virtualization that can be traced back to the beginning of virtualization in computing.
- KVM: Open source virtualization that supports multiple hardware architectures.
- Containers: System containers and application containers.
 - LXD Containers: LXD is a system container manager, built around a very powerful, simple, REST API.
 - Docker Containers: Simplified container with a toolset for container image build process.

What does the IBM Z hardware provide?

The IBM Z hardware provide the foundation with functions critical to the success of virtualization, particularly on a large scale. The IBM Z hardware partitioning, managed by the Processor Resource/System Manager (PR/SM), allows to divide one physical server into logical partitions (LPAR) running a mix of multiple instances of the following operating systems: z/OS, Linux, z/VSE, z/TPF, and multiple instances of the following hypervisors: z/VM and KVM. This is referred to as the 'Standard Mode'.

The IBM Z system resources can be dedicated to a particular LPAR or shared across LPARs. The IBM Z LPAR technology is the only commercial platform with EAL5 security classification. This certification means that although different workloads are running on the same hardware, they are protected when running in separate partitions; one LPAR cannot reach across boundaries into the next LPAR and compromise its security.

The IBM Secure Service Container partition is a specialized container for installing and running specific appliances. Unlike most other types of partitions, a Secure Service Container partition contains its own embedded operating system, security mechanisms, and other features that are specifically designed for simplifying the installation of appliances, and for securely hosting them.

The inter-partition communication, called HiperSockets, provides high-speed TCP/IP connectivity through the system memory and eliminates the need for any physical cabling or external networking connection between servers running in different LPARs.

Another administrative mode, the IBM Dynamic Partition Manager (DPM), is available for Linux-only environments running on IBM Z and LinuxONE.

What is IBM Dynamic Partition Manager?

IBM Dynamic Partition Manager (DPM) is designed to perform simplified configuration for Linux users. DPM allows to be quickly configure LPARs, along with the management of system resources including integrated dynamic I/O management, as easily as other virtualized environments. It was developed for new-to-Z users working on servers with KVM on IBM Z, z/VM, Secure Service Container, and Linux for Z as a partition-hosted operating system.

The DPM is not a replacement for PR/SM – it is PR/SM. More specifically, it is a new administrative mode of PR/SM that allows for simplified configuration of partitions, associated resources and I/O.

DPM is provided with all IBM z15, IBM z14, IBM z13s, IBM z13, and IBM LinuxONE servers. DPM provides simplified, consumable, and enhanced partition lifecycle and dynamic I/O management capabilities via the Hardware Management Console (HMC) to:

- Create and provision an environment includes the creation of new partitions, assignment of processors and memory, and configuration of I/O adapters (network, FCP storage, crypto, and accelerators)
- Manage the environment by modifying system resources without disrupting running workloads
- Monitor and troubleshoot the environment to identify the source identification of system failures, conditions, states, or events that may lead to workload degradation

This simplifies system administration tasks for those with limited IBM Z skills. Learn more: [Dynamic Partition Manager Guide](#)

What does IBM z/VM and IBM Wave for z/VM for the Linux environment on IBM Z?

z/VM provides new function and technology exploitation on IBM Z that helps enable customers to virtualize processors, communications, memory, I/O, and networking resources, with the potential to help reduce the need to plan for, purchase, install hardware to consolidate, and support new workloads. With support for IBM Z dynamic reconfiguration capabilities, z/VM helps enable resources, such as processors and memory, to be added to an active LPAR running z/VM non-disruptively. Customers can configure their systems to help reduce the need to restart z/VM. They can dynamically add processors, channels, OSA adapters, I/O, and memory to both the z/VM system itself and to individual guests. Some examples are the new IBM Infrastructure Suite for z/VM, z/VM Directory Maintenance Facility (DirMaint™), Operations Manager for z/VM, z/VM Resource Access Control Facility (RACF), and Performance Toolkit for VM.

For detailed information about z/VM refer to the [z/VM Data Sheet](#) and the [z/VM FAQ](#). More information is available at ibm.com/it-infrastructure/z/zvm and www.vm.ibm.com/newfunction

IBM Wave for z/VM is a comprehensive management solution for z/VM-based virtual Linux server environments on IBM Z. It provides outstanding virtualization management capabilities through unique

visualization and simplification technologies. IBM Wave's management facilities are designed for Linux and z/VM system administrators, programmers, and operators.

For detailed information about IBM Wave refer to the [IBM Wave for z/VM Data sheet](#) and [IBM Wave for z/VM FAQ](#). More information is available at ibm.com/marketplace/wave-for-zvm

z/VM and IBM Wave provide the capability to host the whole life cycle of servers from development, test, training to production.

Is Sub-capacity pricing available on z/VM?

Yes, sub-capacity pricing for the z/VM operating environment for clients running z/VM V7.1 or V6.4. Software pricing at less than full machine capacity can provide more flexibility and improved cost of computing as a client manages the volatility and growth of new workloads.

The client benefits of sub-capacity pricing for select z/VM programs will be:

- Pay for z/VM programs based on defined workload requirements and not necessarily the full engine capacity of the machine.
- Add hardware capacity for new workloads, capabilities, and functions, e.g. KVM or appliances, and not have IBM software pricing for z/VM programs automatically increase for existing workload
- Buy new hardware capacity for future growth with no immediate increase to their IBM software bill provided that no additional software capacity is required at that time.
- Potentially benefit from improved price performance as workloads grow.

For more information read: [Sub-Capacity for z/VM](#)

What are the feature functions in z/VM V7.1?

IBM z/VM V7.1 is available since September 21, 2018. Detailed information, including the PTF availability, can be found on the www.vm.ibm.com/zvm710 and [z/VM Continuous Delivery News](#) web pages.

Is KVM on IBM Z like open source KVM for other instruction-set architectures?

Yes, KVM is an open virtualization alternative for IBM Z. KVM provides standard Linux and KVM interfaces for operational control of the environment. In addition, KVM integrates with standard OpenStack® virtualization management tooling, enabling enterprises to easily integrate Linux servers into their existing infrastructure and cloud offerings.

KVM is an ideal choice for clients who want open virtualization while taking advantage of the robustness, scalability, and security of the IBM Z platform. KVM delivers a Linux-familiar administrator experience that can enable simplified virtualization management and operation and allows for easy integration into existing infrastructure and cloud offerings.

KVM on IBM Z is optimized to exploit the IBM Z architecture for scalability, performance, security, and resiliency. See IBM's base information on KVM:

ibm.com/support/knowledgecenter/linuxonibm/iaaf/lnz_r_kvm_base.html

What is IBM Cloud Infrastructure Center?

IBM Cloud Infrastructure Center is an advanced infrastructure management offering, built on OpenStack®, including on-premises cloud deployments of IBM z/VM-based Linux virtual machines on the IBM Z and IBM LinuxONE™ platforms.

What are the advantages of IBM Cloud Infrastructure Center?

The IBM Cloud Infrastructure Center delivers the following capabilities:

- Easy provisioning of virtual machine instances into an on-premises cloud via a self-service portal that include network and storage bindings, and optionally also image deployment.
- Fast provisioning of virtual infrastructure to be consumed by OpenShift
- Infrastructure provisioning that can be confined by workflow-driven policies, such as approval flows, expiration dates, or resources quotas.
- Automated configuration of I/O and network resources
- Image management that includes virtual machine image capture, catalog and deployment
- Multi-tenancy support
- Easy integration into higher-level cloud automation and orchestration tools
- Federation of an on-premises cloud with other OpenStack clouds via standard OpenStack APIs establishing a multi-region cloud
- It is built to require no specific platform skills from the end user and minimal platform skills from the administrator to accelerate cloud deployments

Can IBM Cloud Infrastructure Center be integrated with other cloud management tools?

Yes, IBM Cloud Infrastructure Center enables for the integration to higher-level cloud automation tools, such as IBM Cloud Automation Manager or VMware vRealize Automation / Orchestration.

Are Containers supported with Linux on IBM Z?

Yes, there several possibilities to use containers with Linux on Z. IBM announced plans⁴ to offer IBM Cloud Paks as the strategic environment and offers IBM Cloud Private, enabling the portability across hardware platforms and clouds. In addition, the Docker is supported, as well as container solutions from the Linux distribution partners.

Is Red Hat OpenShift available for Linux on Z?

IBM has announced plans⁴ to bring Red Hat OpenShift to the IBM Z. The goal for Red Hat OpenShift for IBM Z will be to help clients enable greater agility and portability through integrated tooling and a feature-rich ecosystem for cloud-native development to:

- Deliver containerized applications that can scale vertically and horizontally;
- Accelerate deployment and orchestration of containers with Kubernetes;
- Help IT to support rapid business growth;
- Optimize workloads to take advantage of pervasive encryption; and
- Increase container density that can make systems management easier which should help reduce total cost of ownership.

Are IBM Cloud Paks available for Linux on Z?

Yes, '[Cloud Pak for Applications V4.0](#)' is available and extends support for Red Hat OpenShift Container Platform 4.2 onto IBM Z.

IBM has announced plans to bring additional IBM Cloud Paks to IBM Z. IBM Cloud Paks are enterprise-ready, containerized software solutions that give clients an open, faster and more secure way to move core business applications to any cloud. Each IBM Cloud Pak includes containerized IBM middleware and common software services for development and management, on top of a common integration layer – designed to reduce development time and operational expenses. Learn more: [IBM Cloud Paks](#)

Is IBM Cloud Private available for Linux on IBM Z?

Yes, IBM Cloud Private (ICP) is a Platform as a Service (PaaS) environment for developing and managing containerized applications; it gives developers and IT operations a combination of critical capabilities to transform the enterprise. [IBM Cloud Private on IBM Z](#) provides the advantages of a private cloud on a server platform optimized for data and cognitive services, designed to deliver the benefits of a public cloud in a security-rich, scalable and reliable environment. [IBM Secure Service Container for IBM Cloud Private](#) delivers pervasive encryption and data protection capabilities.

Is Docker available for Linux on IBM Z?

Yes, IBM has expanded containers into the enterprise with IBM Z supporting [Docker](#). Here a collection of examples to show how [Dockerfiles](#) could be created and used on Linux on Z.

IBM Integrated Facility for Linux (IFL)

What is the IBM Integrated Facility for Linux (IFL)?

The IBM Integrated Facility for Linux (IFL) is a processor dedicated to run Linux workloads on IBM Z servers. It is an optional feature, attractively priced and supported by z/VM, KVM on IBM Z, and the Linux distributions for IBM Z.

An IFL provides the functionality of a general-purpose processor (CP), and since z13, the IFL provides an optional multithreading technology (SMT) and Single Instruction Multiple Data (SIMD), designed to improve the performance capacity – both technologies are improved with z15 models.

Since an IFL can run many virtual servers, a consolidation onto an IFL can result in less IT costs, especially when the software licensing costs are priced per core.

The inclusion of an IFL will not increase charges for IBM Z software running on general purpose processors.

What are the values of the IFL?

The IFL processor enables you to purchase attractive priced processing capacity exclusively for Linux workloads:

- The IFL is always a full capacity processor.
- The IFL provides the functionality of a “standard” processor on an IBM Z server.
- The IFL provides an optional multithreading technology (SMT) and Single Instruction Multiple Data (SIMD), since z13.
- HiperSockets can be used for communication between virtual Linux servers and Linux and other operating system images.
- z/VM and IBM Wave, as well as most IBM Linux middleware products are priced per processor (core) with a one-time-charge (OTC) and an annual, optional maintenance charge, called Subscription and Support (S&S).
- Many software vendors have adopted the IBM pricing model for the Linux workloads.
- The IFL does not increase charges for IBM Z software running on “standard” processors in the server. It does not affect the MSU rating or the IBM Z model designation.

Can I buy an IBM Z server that is made up entirely of IFL engines and no “standard” engines?

Yes; dedicated IBM Z Linux servers – “Linux-only servers” - are available. You can order “IFL-only” servers that are based on the z15, z14 and z13 server technology. For more information, ask your IBM or Business Partner representative.

What types and portions of workloads are eligible/authorized to execute on IFLs?

IBM authorizes customers to use IFLs only to execute the processing of Eligible Workloads of specific Programs expressly authorized by IBM as specified in the “Authorized Use Table for IBM Machines”.

The table can be found at: ibm.com/systems/support/machine_warranties/machine_code/aut.html

Can I run Linux on a standard IBM Z processor?

Yes, Linux runs on the “standard” processors on an IBM Z server, an IFL is not required. That is true for z/VM and KVM as well.

Can I run z/VM in an LPAR which has a mix of standard and IFL processors?

Yes. The z15, z14, z13, z13s, zEC12, and zBC12 support z/VM-mode logical partitions (LPARs), which allow multiple types of IBM Z processors to be defined in the same z/VM LPAR, including:

- Central Processors (CPs)
- Integrated Facility for Linux Processors (IFLs)
- IBM Z Systems Integrated Information Processors (zIIPs)
- IBM Z Systems Application Assist Processors (zAAPs)
- Internal Coupling Facility Processors (ICFs)

z/VM exploits this capability by expanding its guest support for specialty processors to allow these processor types to be defined as virtual CPUs.

Where can I get more information on the Integrated Facility for Linux (IFL)?

The information is available at: ibm.com/marketplace/integrated-facility-for-linux-ifl

IBM Storage solutions

What IBM Storage products are available to support the Linux distributions on IBM Z?

The Linux on Z is supported with the

- IBM FlashSystem®,
- IBM SAN Volume Controller (SVC),
- IBM Storwize®,
- IBM System Storage® DS8000® series,
- IBM XIV® Storage System.

The most current information is available at: [IBM System Storage Interoperation Center \(SSIC\) - ibm.com/systems/support/storage/ssic/interoperability.wss](http://ibm.com/systems/support/storage/ssic/interoperability.wss)

Please insert the details of your selected configuration:

1. Select the 'Storage Model'
2. select 'IBM z Systems' as 'Host Platform'
3. select the Linux distribution (Red Hat, SUSE or Ubuntu) from the 'Operating Systems' pull-down

[New Search](#) > [Host Platform](#) > [Storage Model](#) >

Configuration Results =

[SSIC Education and Help](#)

Storage Family IBM System Storage SAN Volume Controller	Storage Model SVC Host Attachment	Storage Version (Export Selected Version) 13 selections
Connection Protocol 2 selections	Host Platform IBM z Systems	Server Model (Compatibility Resources) IBM z Systems Servers
Operating System Select your Linux distribution	Adapter (HBA, CNA, etc) 23 selections	SAN or Networking 59 selections
Clustering <none>	Multipathing 6 selections	

Submit

Configuration Results =

[SSIC Education and Help](#)

Support, Services, and Education

What are the IBM tested and Partner certified Linux environments on IBM Z?

You can ask your IBM or Business Partner representative, or look at the “Tested Platforms” web page ibm.com/it-infrastructure/z/os/linux-tested-platforms

Does IBM provide tuning tips for Linux on IBM Z?

Yes, the Linux team for IBM Z provides a collection of tips and observations at the “Tuning hints & tips” web page ibm.com/developerworks/linux/linux390/perf/index.html.

Which collateral provides technical guidance and experiences?

IBM Redbooks® typically provide positioning and value guidance, installation and implementation experiences, typical solution scenarios, and step-by-step "how-to" guidelines. They often include sample code and other support materials that are also available as downloads from this site; [Linux on Z related Redbooks](#)

Do IBM and the Linux distributors offer support services for Linux on IBM Z?

Yes. IBM Global Services does offer IBM Support Line for Linux on Z from Canonical, Red Hat, and SUSE. IBM is delivering high quality, reliable, comprehensive remote support. We offer a full portfolio of flexible Linux remote support services including Support Line for Linux with Linux Subscription, which authorizes you, access to the distributor's version of Linux and to maintenance packages, updates and upgrades. The service provides unlimited calls for unlimited callers and assistance. Visit: ibm.com/it-infrastructure/z/os/linux-support

The Linux distributors offer support, you can explore the extent of their support services via: [Red Hat support services](#), [SUSE support services](#), and [Canonical \(Ubuntu\)](#). Please contact the Linux distribution partners for further questions about their service and support offerings.

What services are available for Linux on IBM Z?

IBM Systems Lab Services and IBM Global Services offer specific Linux services. The latest information can be found at the Support and “Services” web page (at the bottom) ibm.com/it-infrastructure/z/os/linux-support

What education is available for the Linux on IBM Z environment?

IBM provides almost every month a webcast, featuring latest technical features, hints and tips. Replays and information about the upcoming themes can be found at the “Live Virtual Classes” web page developer.ibm.com/tv/linux-ibm-z

As well, IBM hosts Executive Council meetings in New York, United States to provide education on Linux on Z. The dates and presentations are posted at: “IBM Z Linux Executive councils” ibm.com/it-infrastructure/z/os/linux-education

Education classes are available to introduce you to Linux and give you the hands-on experience you need to install and configure Linux on Z. The information can be found on the “Education” web page (at the bottom) ibm.com/it-infrastructure/z/os/linux-education

Resources

Linux on IBM Z	ibm.com/it-infrastructure/z/os/linux
IBM z/VM virtualization	ibm.com/it-infrastructure/z/zvm and www.vm.ibm.com/newfunction
IBM Wave for z/VM	ibm.com/marketplace/wave-for-zvm
KVM for IBM Z	see 'Linux distributions' below, and for IBM's base information: ibm.com/support/knowledgecenter/linuxonibm/liaaf/lnz_r_kvm_base.html
IBM Cloud Infrastructure Center	ibm.com/us-en/marketplace/cloud-infrastructure-center
IBM Dynamic Partition Manager (DPM)	ibm.com/support/docview.wss?uid=isg298495726beda108c85258194006e111d
Client success stories	ibm.com/it-infrastructure/z/os/linux-success
Tested platforms	ibm.com/it-infrastructure/z/os/linux-tested-platforms
Integrated Facility for Linux (IFL)	ibm.com/marketplace/integrated-facility-for-linux-ift
Resources	ibm.com/it-infrastructure/z/os/linux-resources
Storage Interoperation Center (SSIC)	ibm.com/systems/support/storage/ssic/interoperability.wss
IBM Software Availability tool	publib.boulder.ibm.com/infocenter/prodguid/v1r0/clarity/productsOnOs.html
IBM Cloud Paks	ibm.com/cloud/paks
IBM Cloud Private	ibm.com/us-en/marketplace/cloud-private-on-z-and-linuxone
IBM Blockchain	ibm.com/it-infrastructure/z/capabilities/blockchain-transactions
Open source software	ibm.com/it-infrastructure/z/os/linux-open-source
Open source software community	ibm.com/developerworks/community/groups/community/lozopensource
Validated open source software IBM Z	ibm.com/developerworks/community/forums/html/topic?id=5dee144a-7c64-4bfe-884f-751d6308dbdf
Examples of Dockerfiles	github.com/linux-on-ibm-z/dockerfile-examples
<ul style="list-style-type: none"> ▪ Vendor (ISV) products ▪ Red Hat catalog ▪ SUSE catalog ▪ Canonical (Ubuntu) 	<ul style="list-style-type: none"> ▪ www-304.ibm.com/partnerworld/gsd/homepage.do ▪ Red Hat product catalog - search page ▪ SUSE partner software catalog for z Systems ▪ Ubuntu software partners
Technical Support and Services	ibm.com/it-infrastructure/z/os/linux-support
IBM developerWorks® Linux	ibm.com/developerworks/linux
Education & Linux executive council	ibm.com/it-infrastructure/z/os/linux-education
IBM Z	ibm.com/it-infrastructure/z
IBM LinuxONE	ibm.com/linuxone
IBM Storage Systems	ibm.com/systems/storage

Linux distributions for IBM Z

Red Hat	www.redhat.com/en/store/red-hat-enterprise-linux-ibm-system-z
SUSE	www.suse.com/products/systemz
Ubuntu	www.ubuntu.com/download/server



© Copyright IBM Corporation 2020
IBM Corporation
New Orchard Road
Armonk, NY 10504
U.S.A.
01/20

IBM, IBM logo, IBM Z, ClearCase, Cloudant, Cognos, Db2, Db2 Connect, developerWorks, DirMaint, DOORS, DS8000, FICON, FileNet, FlashSystem, GDPS, Guardium, HiperSockets, IBM Cloud Pak, Informix, InfoSphere, LinuxONE, Maximo, IBM MobileFirst, MQ, Optim, PR/SM, RACF, Rational, Redbooks, Spectrum Scale, SPSS, Storwize, System Storage, System z10, System z10 Business Class, Team Concert, UrbanCode, Watson, WebSphere, XIV, z10, z10 BC, z10 EC, z13, z13s, z14, z15, zEnterprise, z/OS, z Systems, z/VM, and z/VSE are trademarks or registered trademarks of the International Business Machines Corporation.

Adobe, the Adobe logo, PostScript, and the PostScript logo are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States, and/or other countries.

Cell Broadband Engine is a trademark of Sony Computer Entertainment, Inc. in the United States, other countries, or both and is used under license therefrom.

InfiniBand and InfiniBand Trade Association are registered trademarks of the InfiniBand Trade Association.

Intel, Intel logo, Intel Inside, Intel Inside logo, Intel Centrino, Intel Centrino logo, Celeron, Intel Xeon, Intel SpeedStep, Itanium, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

The registered trademark Linux® is used pursuant to a sublicense from the Linux Foundation, the exclusive licensee of Linus Torvalds, owner of the mark on a worldwide basis.

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both.

OpenStack is a trademark of OpenStack LLC. The OpenStack trademark policy is available on the [OpenStack website](#).

Red Hat®, JBoss®, OpenShift®, Fedora®, Hibernate®, Ansible®, CloudForms®, RHCA®, RHCE®, RHCSA®, Ceph®, and Gluster® are trademarks or registered trademarks of Red Hat, Inc. or its subsidiaries in the United States and other countries.

RStudio®, the RStudio logo and Shiny® are registered trademarks of RStudio, Inc.

TEALEAF is a registered trademark of Tealeaf, an IBM Company.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Worklight is a trademark or registered trademark of Worklight, an IBM Company.

Zowe™, the Zowe™ logo and the Open Mainframe Project™ are trademarks of The Linux Foundation.

All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

The information contained in this documentation is provided for informational purposes only. While efforts were made to verify the completeness and accuracy of the information contained in this documentation, it is provided "as is" without warranty of any kind, express or implied. In addition, this information is based on IBM's current product plans and strategy, which are subject to change by IBM without notice. IBM shall not be responsible for any damages arising out of the use of, or otherwise related to, this documentation or any other documentation. Nothing contained in this documentation is intended to, nor shall have the effect of, creating any warranties or representations from IBM (or its suppliers or licensors), or altering the terms and conditions of the applicable license agreement governing the use of IBM software.

References in these materials to IBM products, programs, or services do not imply that they will be available in all countries in which IBM operates. Product release dates and/or capabilities referenced in these materials may change at any time at IBM's sole discretion based on market opportunities or other factors and are not intended to be a commitment to future product or feature availability in any way.