IBM z/OS Version 2 Release 3 - Engine for digital transformation

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At a glance

Digital transformation has become ubiquitous, driving higher data and transaction volumes and accelerating the rate of application changes made by enterprises. This creates an emerging need for a software-driven infrastructure that is more flexible and scalable, leading to better utilization of compute, storage, and network resources.

The response is a rapid evolution toward hybrid IT architectures that rely on combinations of off-premises and on-premises IT resources. This evolution has surfaced challenges in capacity, scale, availability, and throughput required to improve business performance, meet response time objectives, protect sensitive data and transactions, and minimize operational risk for an exceptional customer experience. All areas of IT are affected, including data center investment, development of next-generation cloud applications, and application lifecycle management.

IBM(R)'s z/OS(R) V2.3 operating system delivers innovations designed to build the highly scalable and highly securable next-generation infrastructure needed. z/OS V2.3 delivers the performance, availability, scale, I/O support, and security to provide the infrastructure, on or off premises or provisioned as-a-service, that allows for instant reacting to business opportunities.

Overview

IBM z14 and z/OS V2.3 are intended to help clients in their efforts to keep applications and data available, system resources secure, server utilization high, and programming environments adaptable while maintaining compatibility for existing applications.

z/OS V2.3 helps to provide a simple, consumable approach to enable extensive encryption of user data, simplify the overall management of the z/OS ecosystem to increase productivity, and provide a simple, consumable approach for self-service provisioning and rapid delivery of software as a service, while enabling for the API economy.

New approach to encryption

z/OS V2.3 and z14 can help drive pervasive encryption efforts within an enterprise by supporting clients in their objective to meet complex compliance mandates by creating a fortified perimeter around core business data.

z/OS is designed to provide new policy-based encryption options that take full advantage of the improvements in the z14 platform and can help clients protect their critical business data. These new capabilities include:

- Enhanced data protection for many z/OS data sets, zFS file systems, and Coupling Facility structures gives users the ability to encrypt data without needing to make changes to applications to imbed encryption APIs within applications.
- New z/OS policy controls make it possible to use pervasive encryption to protect user data and simplify the task of compliance.
- z/OS Communications Server includes encryption-readiness technology to enable z/OS administrators to determine which TCP and Enterprise Extender traffic patterns to and from their z/OS systems meet approved encryption criteria.

Simplify and modernize the user experience to enhance productivity

z/OS V2.3 will simplify and modernize the user experience and help make pertinent information readily available and more accessible, including:

- z/OSMF will be started during the z/OS IPL process so that z/OSMF services, such as notification services, are present for exploiters of z/OSMF.
- Continuing to lay the foundation for installation improvements through enhancements to the software packaging and installation capabilities in z/OSMF that provide the basis for a common installer.
- A new z/OSMF plug-in, Sysplex Management, provides detailed views of sysplex infrastructure resources such as sysplexes and z/OS systems, CFs and CF structures, CF structure connectors, couple data sets and policies, and coupling links.

Transform from an IT cost center to a value-generating service provider

The z/OS platform provides the following foundational capabilities for private cloud service delivery:

- z/OSMF will support workflow extensions for IBM Cloud Provisioning and Management for z/OS.
- z/OS V2.3 delivers Real-Time SMF Analytics infrastructure support, which will enable faster processing for high-volume SMF data, providing enhanced response times required for real-time analysis of SMF data in analytics and cloud applications.
- Enabling the z/OS platform with these cloud capabilities delivers innovations not only in certain infrastructure elements and components of the z/OS operating system, but also in selected levels of various z/OS software subsystems such as IBM CICS® Transaction Server for z/OS, IBM IMS™ for z/OS, IBM DB2® for z/OS, IBM MQ for z/OS, and IBM WebSphere® Application Server for z/OS.

Summary

The enhancements delivered in z/OS V2.3 provide an enhanced platform that supports clients in building next-generation infrastructure.

The z14 processor, as announced in Hardware Announcement 117-044, dated July 17, 2017, is supported by z/OS V2.1, V2.2, and V2.3. See the "z/OS support for Z servers" topic in the Description section for details.

Key prerequisites

z/OS V2.3 runs on these IBM Z family servers:

- IBM z14
- IBM z13™
- IBM z13s

- IBM zEnterprise(R) EC12 (zEC12)
- IBM zEnterprise BC12 (zBC12)

For a complete description of z/OS V2.3 hardware requirements, see *z/OS Planning for Installation* (GA32-0890) in IBM Knowledge Center.

Planned availability date

September 29, 2017

Description

The following functions being delivered with z/OS V2.3 are the culmination of both functions delivered via continuous delivery since z/OS V2.2 GA and new functions that are unique to the z/OS V2.3 delivery. When new function APARs are introduced in the IBM service stream for the entire z/OS platform, you can find them collected on the web in a convenient reference format. You can use information found at the New Function APARs for the z/OS Platform website to review the latest enhancements from IBM to help determine which of the latest functions you want to implement.

Availability, scalability, and performance

Measurements of some key resources can be captured, and new commands and reporting mechanisms are provided to assist in reducing or eliminating JES2 resource exhaustion. Reserved space can optionally be set aside for use in recovering the environment when resources are nearing exhaustion. Thresholds can be set and alerts issued well before resource exhaustion and a possible outage occurs.

System SSL queries ICSF to determine the suite of clear-key RSA hardware functions that is available for use by z/OS System SSL. In the event of an interruption that prevents System SSL from using hardware-assisted services from ICSF, System SSL falls back to RSA operations implemented in software. On subsequent RSA operations, System SSL first tries ICSF before falling back to its software. This new capability helps maintain the availability of applications and exploit hardware without intervention.

Performance improvements have been made to z/OS BCPii queries of activation profile connection types, as well as capacity record and user-defined image group connection types when the BCPii query request targets a z13(TM) GA2 server or higher. This is in addition to significant BCPii performance improvements already available on the z13 GA2 processor. You can now set multiple hardware attributes in a single z/OS BCPii API call. This helps improve both performance as well as the ability to set multiple values at near the exact same instant in time, allowing for more precise control of the hardware. Furthermore, constraint relief relating to the maximum size data returned on a z/OS BCPii query call is provided. The previous limit of 28,000 bytes per query call has been raised to a total of 350,000 bytes per query call, enabling the receipt of attributes that are longer in length to be received on a single call. Additionally, HTTP streaming support is provided to the z/OS Client Web Enablement Toolkit for both sending and receiving data. Instead of the current limit of only sending or receiving data that can fit in a single supplied storage buffer, the toolkit can now be coded with streaming send or streaming receive exits that can be driven multiple times to enable the sending or receiving of data of any length.

In z/OS V2.3, an optional multiple OAM configuration enables a separate OAM tape library address space and up to two OAM object support address spaces. Each OAM object support address space can be connected to a unique DB2 subsystem, and each can optionally participate in different OAMplexes. This support gives OAM object users more flexible and scalable OAM configurations, including the ability to deploy production and test instances of OAM on the same system, to isolate

tape library processing from object processing, or to host multiple production OAM instances on the same system.

Application developers can exploit this functionality by directing OAM OSREQ application requests to a specific OAM object support instance. Note that the optical level of the OAM storage hierarchy is not supported in a multiple-OAM configuration. In addition, prior to z/OS V2.3, OAM maintained collection entries for object processing in two locations, the catalog and in DB2. Now in z/OS V2.3, OAM simplified this support and no longer creates or references OAM collection entries in the catalog. Coexistence support is provided for an OAMplex so that OAM no longer creates or references OAM collection entries in the catalog and must be applied to any system lower than z/OS V2.3.

In z/OS V2.3, DFSMSdss increases the limit of the number of data sets that can potentially reside on a logical data set backup. The current limitation of 131,070 data sets is increased to allow up to 2,147,483,392 data sets. The intent of this support is to increase the backup list capacity to a point where it potentially is no longer a processing constraint; however, there may be other system-limiting factors that could prevent the new upper limit of 2,147,483,392 data sets from being processed during a logical data set DUMP. The ability to perform a logical data set RESTORE from a backup containing greater than 131,070 is supported with toleration PTFs installed. Any attempt to restore from such a backup on a system that does not have the toleration PTFs installed will result in processing errors.

XES locking dataspaces will be moved to 64-bit memory and exploit large (1M) real memory pages. This support is designed to provide better sysplex scalability for clients running in parallel sysplex configurations using z/OS components or applications which exploit XES locking, such as IRLM/DB2, IRLM/IMS, VSAM RLS, and GRS by avoiding constraints on the number of data spaces that can be associated with an address space and with a single locking exploiter instance. This enhancement will be available in fourth quarter 2017 with APAR OA53037.

z/OS V2.3 allows shorter Workload Management response time goals. WLM is designed to allow goal definitions for average and percentile response time goals down to 1 ms. z/OS RMF™ is designed to report these shorter response times.

z/OS V2.3 IBM Tivoli® Directory Server (ITDS, LDAP) helps reduce the ODBC calls for frequent LDAP requests that load a large amount of data from DB2 by fetching multiple rows. This multiple row fetching improvement is designed to reduce the DB2 calls, improving the LDAP server performance when using the TDBM and GDBM back ends.

Asynchronous CF Duplexing for lock structures is provided to be a continuously available solution that makes duplexing Coupling Facility (CF) Lock structures practical, even at extended distances. It delivers a general-purpose interface for use by any CF lock structure exploiters and provides substantial performance advantages for duplexing lock structures. Asynchronous CF Duplexing is available on IBM z14, IBM z13, and IBM z13s systems processors. It requires CFCC Level 21 with service level 02.16, or higher, z/OS V2.2 SPE with PTFs for APAR OA47796 and RMF V2.2 reporting support delivered with PTFs for APAR OA49148, CF to CF connectivity via coupling links, and exploitation, for example, DB2 12.

PKI Services detects the unavailability of DB2 and provides notification. At a client's choice, PKI Services either shuts down when DB2 is not available or waits for a customer-specified period for DB2 to become available. This capability helps reduce the volume of errors recorded in the job log.

Runtime Diagnostics capabilities and diagnostics are improved and enhanced by following the blockers of enqueue contention and GRS latch contention across a sysplex to find the source of the contention and detect deadlocks between enqueues and GRS latches based on information gathered while following the blockers.

zFS provides the ability for a system programmer, with appropriate authority, to initiate an online salvage of a zFS aggregate in order to repair a damaged file system while the file system is still mounted. In addition, the zFS user cache has

been moved to reside above the 2 GB bar and can now be dynamically changed without restarting zFS.

z/OS V2.3 increases capacity for simultaneous IPSec tunnels in a sysplex by increasing the amount of sysplex-wide security association data that can be stored in the EZBDVIPA coupling facility structure, allowing up to 16,384 lists to be configured.

New z/OS support for High Frequency Throughput Statistics (HFTS) is provided to support a new SMF 98 record with an interval length in seconds to highlight workload inefficiencies before experiencing the consequences.

To support larger XML documents, the XML systems services component is updated to exploit 64-bit addressability.

WLM Sysplex Routing is sensitive to upcoming but not yet active soft capping. This enables clients to optimize the four-hour rolling average for Workload License Charges.

Enhancements in DFSORT are designed to provide performance improvements in both CPU and elapsed times for several DFSORT functions that generate code at run time. The enhancements require no changes from DFSORT end users and are also available on z/OS V2.1 and V2.2 with PTFs for APAR PI58848.

z/OS Allocation and DFSMSdfp enhancements are intended to provide improved scalability for DB2 workloads by allowing the number of concurrent open data sets in a single address space to grow.

DFSMSdfp VSAM record-level sharing (RLS) replaces the existing alternate index (AIX®) upgrade lock with record locks and redo processing to keep the upgrade set and the base cluster in sync for update requests without forcing the updates to be single threaded. Allowing concurrent AIX updates is expected to improve both CPU and elapsed time performance, most notably when updating numerous large records with many alternate keys. Jobs doing inserts, erases, and updates saw up to 48% CPU time improvements and up to 30% elapsed time improvements.[1]

DFSMSdfp SAM and VSAM enhancements provide read-only access to data sets that reside on Peer-to-Peer Remote Copy (PPRC) secondary volumes. Certain applications can take advantage of redundant hardware to potentially improve TCO and avoid interference with production work by leveraging the secondary control unit cache and I/O capacity.

DFSMS CVAF enhancements in z/OS V2.3 help prevent accidental corruption to the VTOC and to provide enhanced VTOC auditing and diagnostics. A new validity checking mechanism (CVAFDIR ACCESS=WRITE) is provided to ensure crucial fields are not being modified when updating data set control block (DSCB) records on the volume table of contents (VTOC). Additional enhancements to the existing VTOC audit record, SMF 42 subtype 27, provide DSCB logging enhancements.

The z/OS NFS Client has increased the size of the RSIZE/WSIZE parameters that can be specified on the MOUNT command. These parameters define the maximum size of data to be read from an NFS Server or written to an NFS Server by single RPC packet. In z/OS V2.3, the setting of RSIZE/WSIZE parameters can now be from 1 KB - 64 KB.

Enhancements to zFS file systems allow files to be compressed utilizing the zEDC compression card technology. Existing file systems can be compressed while in use. This is not limited to new zFS file systems, and existing zFS file systems can be eligible for compression also. Besides compressing files, in z/OS V2.3, unused space in zFS files systems can be reclaimed using the new zFS administrative shrink command.

z/OS Global Mirror (XRC) utilizes more buffer storage for in-flight updates, making it more resilient to transient events that may otherwise cause suspension or stalls. This is also available on z/OS V2.1 and V2.2 with PTFs for APAR OA49548.

SVC Dump is designed to provide task nondispatchability timeout support in z/OS V2.3. This introduces an installation-specified maximum task nondispatchable time value for three address space categories. Tasks within the dumping address spaces can be reset dispatchable if the maximum nondispatchable time has reached for that address space category while SVC dump continues to capture the data in that address space. This new functionality is provided through new keyword MAXTNDSP on the CHNGDUMP console command.

In z/OS V2.3, an enhancement to z/OS system logger allows log stream staging data sets to be allocated greater than 4 GB. The increasing demands on the volume of client data, particularly those for the more recent SMF log streams and for other high-transaction logging rates, for example, for IMS CQS and CTS (CICS) clients, demonstrate it is important to be able to allocate sufficient space in order to optimize their operations. Allowing larger log stream staging data set sizes provides for greater scalability in this higher availability/recoverability log stream configuration.

[1] Based on projections and measurements completed in a controlled environment. Results may vary by customer based on individual workload, configuration, and software levels.

Enhanced security and data protection

ICSF enhancements in z/OS V2.3 for the Crypto Express6S updates include support to exploit new algorithm support and to extend existing support for asymmetric algorithms. This support also requires Firmware/MCL updates to both the TKE and the z13 processor. These are considered co-requisites. See the Driver-27 Exception Letter for the latest MCL bundle requirements for this announcement.

- The Digital Signature Generate (CSNDDSG), Digital Signature Verify (CSNDDSV), and PKA Key Token Build (CSNDPKB) callable services add support for RSA-PSS Signatures to provide for higher assurance and stronger signature support.
- The PKA Key Generate (CSNDPKG) and PKA Key Token Build (CSNDPKB) callable services are expanded to support selectable public exponents in the generation of RSA private/public key pairs.

Additional enhancements to ICSF that are available in z/OS V2.3 provide support for:

- Improved Key Lifecycle and Key Usage auditing to assist with audit compliance and understanding of the state of keys within an environment.
- Auditing of FIPS compliance.
- New Options Data Set Refresh function through the SETICSF command or the ICSF Multi-Purpose service (CSFMPS) to help remove the need for restarting ICSF and prevent outages.
- Enhancing the PKCS #11 Secret Key Encrypt (CSFPSKE) and PKCS #11 Secret Key Decrypt (CSFPSKD) callable services to support clear key AES ciphertext stealing, specifically CS1.
- New ICSF Health Check, ICSF_UNSUPPORTED_CCA_KEYS, which displays a list of records in the active CKDS and PKDS that are no longer supported. It also implements a new option in the Key Data Set List (CSFKDSL) callable service to generate a list of records in the active key data sets of keys that are no longer supported.
- No longer requiring the CKDSN and PKDSN keywords to be supplied in the Installation Options Data Set enables easier setup and configuration for those clients not wanting to exploit secure key operations or manage CCA symmetric or asymmetric key tokens.
- Enhancements to the Digital Signature Generate (CSNDDSG) and Digital Signature Verify (CSNDDSV) callable services to now take as input the message to be signed or verified as well as the prehashed message that is already supported.

Also included in the level of ICSF in z/OS V2.3 is support from the following enhancement APARs:

- OA49443 provided support for new callable service Key Encryption Translate (CSNBKET and CSNEKET). This service is used to change the encryption of key material that is either a key token wrapped with ECB (legacy method) or key material wrapped CBC.
- OA49064 provided for Cryptographic services enhancements, including:
  - Support for new key check value using CMAC algorithm for Key Test2 (CSNBKYT2)
  - Support for AES Galois/Counter mode encryption for Symmetric Algorithm Encipher (CSNBSAE) and Symmetric Algorithm Decipher (CSNBSAD) services
  - Support for new key derivation algorithm for EC Diffie-Hellman (CSNDEDH) service
  - A new Encrypted PIN Translate Enhanced (CSNBPTRE) callable service to support PAN that is encrypted using format-preserving encryption
- OA48452 provided support for a new health check, ICSF_OPTIONS_CHECKS, to verify that certain ICSF options are set to the expected values during initialization.

The ICSF release in z/OS V2.3 supports a Geographically Dispersed Parallel Sysplex™ (GDPS®) environment by enabling Key Data Set (KDS) updates on a production system/sysplex to be propagated to another production system/sysplex or to a backup or disaster recovery (DR) system/sysplex. This support helps improve availability of key material by helping to enable clients to implement a DR sysplex that can take over from the primary sysplex in the event of an outage. This support helps enable cryptographic operations to work correctly after a DR site takeover of the workload.

Support for Crypto Express6S coprocessors available on z14 processors is planned to be available September 14, 2017, for z/OS V2.3, z/OS V2.2, and z/OS V2.1 in the Cryptographic Support for z/OS V2R1 -z/OS V2R3 (HCR77C1) web deliverable. When available, it can be downloaded from the z/OS downloads website. These updates are intended to help clients meet standards and provide better cryptographic security.

ICSF enhancements for the Crypto Express6S updates are intended to include support for a PCI HSM ("Payment Card Industry Hardware Security Module") configured CCA coprocessor:

- CCA Coprocessor in "PCI HSM Compliant Mode" restricts DES keys to PCI HSM approved usage.
  - No multi-use key types allowed (for example, "DATA" keys not eligible for PCI HSM requests).
  - Single-length (8-byte) DES keys not allowed.
  - Keys must be wrapped using the "enhanced wrap" method. ECB wrapped keys are not eligible for use in a compliant mode coprocessor.
- To make a key eligible for use in a compliant mode coprocessor, it must be tagged as PCI compliant.
  - A key can be tagged when newly generated (via Key Token Build (CSNBKTB) and Key Generate (CSNBKGN)) or an existing key can be tagged by Key Token Translate 2 (CSNBKTR2) when the coprocessor is in "Migration Mode."
  - A DES key that is "tagged" is only usable by a compliant mode coprocessor. When ICSF detects a tagged DES key, it will route the request to an eligible coprocessor, or reject the request with an appropriate error code if no compliant mode coprocessor is available.
  - For services that use multiple keys, all keys must be "tagged" as PCI compliant for the request to be eligible for a compliant mode coprocessor.
- A compliant mode coprocessor can be used for "Normal Mode" work for nontagged keys. Thus, all existing workloads can continue to run on a CEX6S coprocessor regardless of the configuration. The PCI HSM restriction only comes into play for DES keys that have been tagged as compliant use only.
- ICSF supports a configuration option keyword, COMPLIANCEWARN, that causes SMF Type 82 audit records to be generated for existing workloads, indicating a

request's eligibility for PCI HSM compliance, allowing customers to determine what application and key changes are needed to exploit a PCI HSM-configured coprocessor.
- A TKE ("Trusted Key Entry") workstation is required to administer a PCI HSM-compliant CCA coprocessor.

In addition to PCI HSM support, CEX6S also introduces the use of X.509 certificates in CCA.

- A TKE is used to manage root and signing certificates installed within the coprocessor.
- A new ICSF callable service Public Infrastructure Request (CSNDPIC) is available to generate PKCS#10 certificate requests.
- The Digital Signature Verify (CSNDDSV) service will be updated to support the use of an X.509 certificate when verifying a signature.

These additional enhancements to ICSF are intended to provide support for:

- New z14 CPACF instructions for SHA-3 hashing, TRNG (True Random Number Generation), and improved performance of AES GCM encryption.
- Removal of 2038/2042 date restrictions.
- A new ability to monitor crypto usage tracking.
  - New SMF Type 82 Subtype 31 records to indicate use of:
    -- Specific hardware or software crypto engines
    -- Cryptographic algorithms
    -- ICSF callable services
  - The capability to monitor crypto usage is designed to help facilitate capacity planning, problem determination, and whether applications are using standards-compliant cryptographic functions.
- An improvement to Key Dataset List (CSNKDSL) service to provide additional search criteria and more details on the returned output. (**Note:** This improvement is available on ICSF HCR77C0 with PTFs for APAR OA52145.)
- An ISPF-based browser for the Crypto Key Dataset (CKDS). The CKDS browser is designed to make it easier for ICSF administrators to manage the life cycle of their cryptographic key material that resides in the CKDS. The CKDS browser is intended to help customers new to ICSF to provision encryption keys for applications and for use by z/OS.
- Improvements to the auditing of CICS applications that make use of ICSF resources. (**Note:** This improvement is only available on z/OS V2.3.)
- The ability to use secure key tokens for the Field Level Encipher and Field Level Decipher (CSNBFLE, CSNBFLD) services. (**Note:** This function is also available on ICSF HCR77B1 and HCR77C0 with PTFs for APAR OA51102.)
- Support for standard international cryptographic algorithms such as DES, AES, RSA, and ECC via ICSF's Regional Cryptographic Enablement with the implementation of those algorithms provided by IBM approved RCE vendor hardware.

In z/OS V2.3, z/OS PKI Services are designed to improve the usability of administrative tasks used to manage requests made through the Simple Certificate Enrollment Protocol (SCEP). This usability enhancement displays the requester's identity, which helps an administrator to quickly locate an outstanding certificate fulfillment request for an SCEP client.

z/OS V2.3 is designed to implement a new SAF service to enable you to specify security rules using an XML document in a way that is intended to be external security manager (ESM) independent. This is also intended to allow external security managers, including RACF(R), to process such a document on other systems to help you implement the security requirements for a program more quickly by generating the necessary commands or making appropriate security database updates. The new service and the XML security declaration document are intended to provide a foundation for tooling intended to help ease the administrative security setup burden

for products that run on z/OS and to help reduce manual errors, to help speed deployment of new products.

With z/OS V2.3, the ITDS server is designed to provide additional SAF-protected MVS™ modify commands that control if sensitive data is excluded or included in ITDS debug traces and by default, these trace points are disabled. This design helps prevent the inadvertent exposure of sensitive data during diagnostic procedures.

The z/OS directory server exploits support for DB2 partition-by-growth for TDBM and GDBM backend databases. A partition-by-growth table space is very useful for those table spaces whose tables do not have a suitable partitioning key but are expected to exceed the 64 GB limit for simple or segmented table space. A partition-by-growth (PBG) table space can grow up to 128 TB. This new capability helps customers more simply manage large LDAP directories and data growth.

The z/OS V2.3 IBM Tivoli Directory Server is designed to support multiple authentication factors that are supported by the IBM Multi-Factor Authentication for z/OS product. The ITDS LDAP directory server is designed to support the specification of old and new passwords or old and new RACF password phrases on LDAP bind requests to the SDBM backend. IBM is also designing to expose MFA-related data through the SDBM backend. IBM supports these extensions on z/OS V2.1 and z/OS V2.2 with PTFs to the ITDS directory server.

In z/OS V2.3, RACF introduces the new ZMFCLOUD class. This class is used to define z/OS cloud-related resources, giving z/OS Cloud security administrators the ability to control access to z/OS cloud-related resources. The ZMFCLOUD class is also available for z/OS V2.1 with PTF UA81660 and z/OS V2.2 with PTF UA81659.

RACF Field Level Access Checking support is enhanced to optionally scope Field Level Access only to those profiles for which the user already has administrative access based on profile ownership or group-SPECIAL scope. This capability is designed to satisfy market requirements MR0405104141, MR00069358, MR00069088, MR00048950, and MR0421051242.

z/OS V2.3 is designed to provide policy-enabled enhanced data protection for z/OS data sets, zFS file systems, and Coupling Facility structures, providing the ability to encrypt data to help strengthen the protection for mission-critical data. These capabilities are designed to help meet compliance and audit requirements. These enhancements include:

- DFSMS is enhanced to support z/OS data set encryption without requiring changes to application programs. This support is designed to allow the installation to specify data sets to be encrypted via policy such as SAF or SMS, or manually. DFSMS makes use of the Central Processor Assist for Cryptographic Functions (CPACF) to encrypt and decrypt sequential extended format data sets accessed through BSAM and QSAM, as well as all types of VSAM extended format data sets accessed through base VSAM and VSAM RLS. In addition, data set encryption is designed to allow the data to remain encrypted during administrative functions such as backup/restore, migration/recall, and replication. Encrypted data sets also can exploit data set compression.
- IMS V14 supports z/OS data set encryption for select data sets. The IMS 15 Quality Partnership Program (QPP) offering also supports these capabilities. The QPP is a closed beta program. It was announced in Software Announcement 216-514, dated December 6, 2016, and began on March 3, 2017. An IMS 15 open beta offering is also now available. See the IBM Early Programs website for additional information, prerequisites, and registration.
- DB2 for z/OS, V11 and V12 support for z/OS data encryption is available at z14 GA, September 13, 2017. DB2 12 will add support for additional DBA controls over encryption options through continuous delivery shortly after September 13, 2017.
- zFS makes use of z/OS data set encryption to support the encryption of files (file content), access control lists, security information, and symbolic link contents. The use of zFS encryption can be paired with compression to offset the overhead of encryption. Customers can create new encrypted zFS file systems with z/OS V2.3. The ability to encrypt and decrypt existing zFS file systems (zFS file

systems created prior to z/OS V2.3) will be available with APAR OA54005 in January 2018 if not sooner.
- z/OS V2.3 gives users the ability to encrypt Coupling Facility data, including list and cache structures, under the control of the Coupling Facility Resource Management (CFRM) policy. z/OS V2.3 uses CPACF to encrypt and decrypt CF data as it is sent to and returned from the CF. The data is encrypted as it travels on the CF link and remains encrypted while resident in the CF.

In z/OS V2.3, the z/OS Communications Server includes z/OS Encryption Readiness Technology (zERT) to help z/OS administrators to determine which TCP and Enterprise Extender (EE) traffic patterns to and from their z/OS systems meet approved encryption criteria and which do not. With zERT, two new types of SMF records can be collected to build a record of the cryptographic protection of all TCP and EE connections:

- zERT Connection Detail records provide a complete cryptographic protection history for each TCP and EE connection as that protection is applied.
- zERT Summary records summarize, at regular intervals, the repetitive use of security sessions between each client and server.

Users can decide which of these records are recorded to the z/OS System Management Facility (SMF) or are made available through a new real-time service for network management applications. Note that support for zERT Summary records is planned as a post-GA deliverable in first quarter 2018 with the PTF for APAR PI83362.

The Application Transparent TLS support in z/OS Communications Server is updated to support new System SSL functions, including updated NIST and IETF standards for encryption algorithms, use of keys and certificates, and Online Certificate Status Protocol updates.

PKI Services, ITDS server, Network Authentication Service (Kerberos) server, and System SSL are designed to support the usage of FIPS 140-2 approved cryptography and are intended to comply with the guidelines of NIST SP800-131A Revision 1.

In z/OS V2.3, System SSL is designed to comply with the following RFCs to help maintain standards-based security and interoperability:

- RFC 6960 X.509 Internet Public Key Infrastructure Online Certificate Status Protocol (OCSP) by allowing a signature algorithm pairs list to be sent on an OCSP request, which can then be used to sign the OCSP response, and updating the signature verification checking of the OCSP response.
- RFC 6961 - The Transport Layer Security (TLS) Multiple Certificate Status Request Extension and RFC 6066 - Transport Layer Security (TLS) Extensions: These RFCs introduce extension definitions that enable clients to determine the revocation status of server certificates, including the intermediate CA and end-entity certificates, in the server's certificate chain.

In z/OS V2.3, PKI Services is designed to support WebSphere Liberty Profile to host the PKI Services web pages interface. This support can help simplify installation and exploits the benefits of the smaller footprint of WebSphere Liberty Profile.

z/OS V2.3 IBM Tivoli Directory Server (ITDS) implements a new z/OS Health Check that is designed to suggest when the DB2 REORG or RUNSTATS utilities should be run for directories in TDBM to help avoid potential performance issues. This helps ITDS administrators determine when it is necessary to use the REORG utility to reorganize TDBM table spaces, indexes, and partitions to help maintain optimal database access performance.

When RACF is invoked to map UID(0) to a user ID, it returns the same value defined in the SUPERUSER keyword of BPXPRMxx. This provides a consistent mapping to the user ID owning an object, such as a file or directory, as displayed by the UNIX™'ls -l' command.

In z/OS V2.3, the RACF Field Level Access Checking support (FLAC) provides additional granularity for administrators that do not have the RACF SPECIAL attribute. This design allows controlled updates to RACF profiles by allowing the FLAC functionality to be optionally scoped, helping to reduce the overall RACF authority needed by an administrator to manage segments in RACF profiles.

New support allows TSO/E user IDs to be eight characters long.

z/OS V2.3 enhances the z/OS UNIX SMF service to allow a more granular check of a new resource in the FACILITY class. In addition to BPX.SMF, the SMF service also checks for BPX.SMF.xxx.yyy, where *xxx* is a specific TYPE and *yyy* is a specific SUBTYPE. This support was introduced for z/OS V2.2 and V2.1 by APAR OA48775.

Simplification, usability, and skills

z/OS V2.3 z/OSMF contains a new function called *Operator Consoles*. This function provides an improved visualization of the z/OS operator consoles, including support for multiple systems in a sysplex.

In z/OS V2.3, JES2 can handle most JES3 JECL and JCL differences through an inline translation facility that translates those differences into equivalent JES2 JECL and JCL. These changes are implemented based on the customer configuration and lower the effort for JES3 to JES2 migration.

z/OS V2.3 z/OSMF Software Management is designed to enable you to use a common process to download portable format packages from any software vendor that makes them available. This enables you to use common tools to download packages from participating vendors in the same user interface. This function is also planned to be made available on z/OS V2.2 with the PTF for APAR PI80825 in third quarter 2017.

In z/OS V2.3, the RMF plug-in for z/OSMF is updated to support the sharing of sysplex definitions across systems.

In z/OS V2.3, z/OSMF is designed to provide support for workflow instances across multiple sysplexes.

In z/OS V2.3, RACF is designed to allow the RACF Data Set Names Table (ICHRDSNT) and Range Table (ICHRRNG) to be specified by means of a SYS1.PARMLIB member. Currently, these are installation-defined load modules that are written, assembled, and link-edited by clients. Defining the RACF Dataset Names Table and the RACF Range table as PARMLIB members will help simplify customization and maintenance for these tables.

z/OS V2.3 enhances AMASPZAP to prevent partial updates by detecting errors in the input SYSIN data from every NAME/CCHHR section, before making any updates to the target data set. Error detection includes syntax errors, VERIFY failures, SETSSI warnings, and CHECKSUM mismatches. This new functionality is enabled with a new keyword, PRECHECK, on the PARM parameter of the EXEC statement.

The z/OSMF WEBISPF plug-in is enhanced in z/OS V2.3 to allow single sign on within a sysplex. This eliminates the need to continuously log on and off as you navigate system to system. This feature will be delivered with the PTF for APAR PI82504 after September 29, 2017.

z/OS V2.3 automates the post-installation configuration process in IBM Knowledge Center for z/OS (KC4z) by exploiting the "Workflows" systems management task available in the z/OSMF base element.

z/OS V2.3 adds a new Workflow Editor to z/OSMF to enable you to edit workflows in the UI instead of directly editing XML files.

Plug-in configuration makes further use of the workflow engine to help guide and simplify plug-in enablement. This support is also available on z/OS V2.2 and V2.1 with the PTF for APAR PI42838.

PDSE attachment in the Incident Log application is enhanced to support a member of PDS and PDSE as an attachment and support entire PDS or PDSE as an attachment. This support is also available on z/OS V2.2 and V2.1 with the PTF for APAR PI55236.

z/OS is enhanced so the z/OS Incident Log integrates with the IBM system (with an IBM service system) to search for a matching APAR before opening a PMR (problem) with IBM. Screen dialog enhancements allow searching using the search strings sourced from the incident. This support is also available on z/OS V2.2 with the PTF for APAR PI66840.

The z/OSMF User Interface now supports the display of currently logged on z/OSMF users, their logon expiry time, and the services that the users are using. In addition, a facility is included to notify logged on z/OSMF users, which can be used to notify users in case z/OSMF needs to be restarted. This support is also available on z/OS V2.2 with the PTF for APAR PI66824 and on z/OS V2.1 with the PTF for APAR PI69100.

Support is provided to the z/OSMF notification framework for user-supplied email addresses. This allows any z/OSMF notification to optionally be sent to a user-specified email address. This support is also available on z/OS V2.2 with the PTF for APAR PI57136 and on z/OS V2.1 with the PTF for APAR PI59489.

z/OSMF supports registration of a mobile device and notification to that mobile device through a push notification service of the client's choice, coupled with a suitable mobile application, such as the zEvent proof of concept. This can serve as an effective z/OS platform-based event facility.

z/OSMF workflow engine security is updated to enable more granular control over who can see workflows and workflow steps during execution. This support is also available on z/OS V2.1 and z/OS V2.2 with the PTFs for APARs PI56621 and PI56641.

The z/OSMF workflow engine is updated to support immediate REXX and script execution, as well as configurable job card information. This support is also available on z/OS V2.1 with the PTF for APAR PI69100 and on z/OS V2.2 with the PTF for APAR PI66824.

In z/OS V2.3, support for PDS member extended statistics in ISPF is improved. ISPF automatically generates extended statistics for a PDS member when extended statistics have been enabled in the ISPF Configuration Utility, and at least one of the line count values for the member exceeds 65535.

The SDSF browser-based UI is updated with new capability aligned with the 3270 UI. For more information on the ENQ and SYM SDSF functions, see the Redbooks(R) website. This support is also available on z/OS V2.1 and V2.2 with the PTFs for APARs PI60412 and PI60831.

The IBM Configuration Assistant for z/OS Communications Server provides the ability to change an active TCP/IP stack configuration by generating the required VARY OBEY member. This support is also available on z/OS V2.2 with the PTF for Configuration Assistant APAR PI80101.

The Configuration Assistant for z/OS Communications Server provides the capability to import configuration information from an existing TCP/IP profile to allow editing of that information from the Configuration Assistant GUI. This support is also available on z/OS V2.2 with the PTF for Configuration Assistant APAR PI66143 and with the PTF for z/OS Communications Server APAR PI63449.

A new z/OSMF plug-in, Sysplex Management, provides detailed views of sysplex infrastructure resources such as Parallel Sysplexes and z/OS systems, CFs and CF structures, CF structure connectors, couple data sets and policies, and coupling links.

z/OS V2.3 will enhance Workload Manager (WLM) to support Tenant Resource Groups (TRGs) as a way to group work, with the ability to independently measure

and cap such groups. For example, customers can classify a group of address spaces and instruct WLM to limit ("cap") CPU consumption related to that group, to a limit also specified in the WLM service definition. Similarly, the cap can be removed, allowing CPU consumption for that workload to continue unrestrained. WLM will also be designed to record CPU consumption for each Tenant Resource Group, leading to enhanced Resource Measurement Facility™ (RMF) reporting for the specified workload. This is planned for year end 2017 and will be enabled for z/OS V2.2 and V2.3 with the PTFs for APARs associated with fix category IBM.Function.PricingInfrastructure.

z/OS V2.3 will support Container Pricing for IBM Z by year end 2017. Container Pricing will provide simplified software pricing for qualified solutions, combining flexible deployment options with competitive economics that are directly relevant to those solutions. For more information on Container Pricing for IBM Z, see Software Announcement 117-044, dated July 17, 2017.

In z/OS V2.3, IBM Knowledge Center for z/OS element (KC4z) is improved to include enhanced navigation. As an alternative to using the table of contents for navigation, each HTML page now features a forward and backward button to provide a more natural reading experience. In the spirit of LookAt, KC4z now includes a new API and user interface that improves message lookup. The same API is also useful for looking up command syntax.

z/OSMF is now a required component of z/OS and is now expected to be installed and configured on at least one system in every sysplex. z/OSMF configuration and start-up has been enhanced:

- z/OSMF PARMLIB member (IZUPRMxx) may be specified in IEASYSxx.
- z/OSMF is optionally started during IPL.
- First-time users of z/OSMF will see a new logon dialog.

SDSF now provides a new user's guide that is designed to provide detailed information for the end user on how to get started with SDSF and how to use the various functions provided as part of SDSF. The new user's guide is available with the rest of the z/OS product documentation. This makes user information easy to search and bookmark, which should improve the user experience with SDSF. The product documentation is also available in Japanese and replaces the Japanese online help with a more comprehensive and usable set of product documentation.

z/OS V2.3 product documentation is improved for both searchability and information currency:

- The z/OS V2.3 Adobe™ Indexed PDF Collection (SC27-8430) contains a human-readable master index with links to all PDFs in the release. It also contains a machine-readable Adobe style index that provides a powerful search across the PDFs.
- The frequency with which z/OS V2.3 PDF and IBM Knowledge Center content can update is improved. With the implementation of automation improvements, the delivery of technical content updates is no longer restricted to a quarterly schedule. IBM Resource Link®, instead of the IBM Publications Center, now hosts z/OS V2.3 PDFs. A subscription service and "last published" dates make it easy to know when content is updated.

Starting in z/OS V2.3, the Library Server ALS indexed z/OS Elements and Features PDF collection, SK4T-4949, is deprecated. Included instead are the z/OS V2.3 Acrobat Indexed PDF Collection, SC27-8430, and the z/OS Base and Features KC4z plug-in collection, SK4T-9263.

Starting at z/OS V2.3 GA on September 29, 2017, IBM Knowledge Center will no longer contain the out-of-service z/OS V1.13 documentation plug-ins. The content will remain available on the z/OS Internet Library.

z/OS platform software installation improvements

As announced in Software Announcement 216-392, dated October 4, 2016, and Software Announcement 217-085, dated February 21, 2017, IBM and other leading industry software vendors have been collaborating on a variety of installation-related improvements. IBM intends to help drive z/OS platform-wide improvements in installation and deployment, along with functions that are intended to enable other software vendors to use them. Many of the functions designed to meet these requirements are now available in the z/OSMF component of z/OS V2.2 in PTFs, and more functions are planned. See the prior announcements for more detail.

In z/OS V2.3, support is added for several additional z/OSMF Software Management functions along with changes to the ServerPac offering to further this strategy. These functions also fulfill some of the prior statements of direction made in Software Announcement 217-085, dated February 21, 2017:

- The first is a new capability to add product and feature information for products that are not packaged using SMP/E to software instances. This capability builds on prior functions designed to enable you to define a software instance with SMP/E-packaged content, non-SMP/E-packaged content, or mixed content. It is intended to allow the product and feature content of a software instance to be displayed when that software instance includes one or more products that are not SMP/E-packaged. Also, a corresponding function is designed to provide end-of-service display capability for products when a product information file containing end-of-service information is available from the software vendors who provide the products. These functions are also available for z/OS V2.2 and z/OS V2.1 with the PTFs for APAR PI79666.
- Another new function is designed to provide a RESTful programming interface that allows a portable software instance to be created, by exporting a previously defined software instance. This function can be used to automate the creation of a software instance using a program. A sample REXX exec that can be used in a batch job is also provided in the IZUDXEXP member of the samplib data set; it is intended to create a software instance and then export it to create a portable software instance. This function is also available for z/OS V2.2 with the PTF for APAR PI72283.
- A function is designed to enable you to download a portable software instance from a software vendor that makes one available, or a download site you support. This function is planned to be available for both z/OS V2.3 and z/OS V2.2 with the PTFs for APAR PI80825.
- The ServerPac offering is planned to support ordering and delivery of products that are not SMP/E packaged in October 2017. The products that are available today in the z/OS stand-alone ordering path in Shopz, including non-SMP/E-packaged products, are planned to be made available in ServerPac by April 2018. As they are made available in ServerPac, they are planned to be removed from the z/OS stand-alone ordering path in Shopz.
- Additionally, starting with z/OS V2.3 orders, ServerPac supports starting z/OSMF automatically during IPL. Also, the CustomPac Installation Dialog used for ServerPac installation supports the use of TSO/E user IDs up to 8 characters in length.
- Concurrent with z14 hardware availability, the Customized Offerings Driver (5751-COD) is updated to support installing z/OS on z14 processors, as well as support the installation of z/OS V2.3 using either ServerPac or CBPDO. The Customized Offerings Driver is available on DVD.

Systems management

'Manually create incident' is a new function of the z/OSMF Incident Log that addresses the customer requirement to create an incident without a corresponding SVC dump. Like all incidents, these manually created incidents can have documentation attached to them and therefore be sent to a service provider.

With z/OS V2.2, DFSMSrmm introduced retention by catalog to the EXPDT retention method, which allowed a cataloged data set to prevent the tape volume from expiring on its expiration date if WHILECATALOG(ON) was specified. However, not all commands supported the new parameter. New enhancements in z/OS V2.3 add the WHILECATALOG and Expiration Time parameters to all applicable DFSMSrmm

functions, including DFSMSrmm reports, providing the user with a consistent interface and improved usability and flexibility.

In z/OS V2.3, DFSMSrmm enhances retention management by extending usage of SMS Management Class (MC), allowing both disk and tape data sets to be managed using the same set of policies. A new SMS MC attribute, Retention Method, allows the retention method (EXPDT or VRSEL) to be assigned to new tape volumes. Several other SMS MC attributes are provided around volume set management as well as the ability to exclude tape data sets from VRSEL inventory management. The existing WHILECATALOG support can now be specified through SMS MC as well. These enhancements help simplify and consolidate DFSMSrmm retention policies with SMS policies rather than VRS policies and potentially reduce DFSMSrmm inventory management overhead.

Prior to z/OS V2.3, for DFSMSrmm the UXTABLE was the only alternative to modifying SMS ACS routines and Management Classes if users wanted to dynamically assign retention parameters to newly written tape data sets and volumes. However, the existing UXTABLE is difficult to understand and manage and requires manual compilation and understanding of RMM exits. Updates require the source code, and there is no way to check the contents of the currently loaded UXTABLE. With z/OS V2.3, DFSMSrmm introduces the Default Table, defined in the EDGDEFxx PARMLIB member, which provides the same function as the UXTABLE, but is much simpler to maintain and manage. To use the Defaults Table, the DEFTABLE(xx) option must be added to the EDGRMMxx parmlib member, and a new sample script, EDGRDEF, can be used to convert an existing UXTABLE into the Default Table format.

SDSF V2.3 continues the rapid delivery of new function that was established with z/OS V2.2. New capabilities include commands that are designed to display the following:

- Mounted z/OS UNIX file systems
- DFSMS storage groups and volumes
- Coupling facility connections and structures
- TCIP activity
- DASD activity
- Defined subsystems
- Generic tracker events
- Orphaned Common Storage
- Virtual Storage Map
- Task structure for address spaces
- Loaded modules for address spaces

SDSF in z/OS V2.3 supports new enhancements in JES2, particularly in the areas of resiliency, providing visibility to reserved space as well as measurements of spool and control block consumption.

The Capacity Provisioning Manager supports a new SETBASE command for the management of defined capacity and group capacity. The SETBASE command can simplify the management of soft caps as it provides an efficient capability to modify the management base of the provisioning manager, and, through the same command, increase or decrease the soft cap. In the latter, it's possible to specify how long activated capacity should remain active.

A new keyword called *zFS* is being introduced to IDCAMS DEFINE in z/OS V2.3. It can be used during the creation of a new zFS file system. Customers can use the new keyword to modify their existing Automatic Class Selection (ACS) routines to direct the creation of zFS file systems on a specific set of targeted storage volumes.

z/OS V2.3 is designed to provide a new facility, z/OS Function Registry, for products or functions to advertise both the availability of the functions availability in the operating system and their capability as defined by those functions.

z/OS V2.3 is designed to provide the health state of the CPM-managed domain through the following functional additions:

- Receive an overview of how the entirety of the managed domain is affected by current problems and which problem relates to which management object.
- Obtain a summary of all past CPO error messages (WTOs) that are still valid.
- Get a direct correlation between current error messages and the consequences for the management of CPM configuration objects.

z/OS V2.3 RMF is designed to support monitoring and reporting of system environments with more than 65,280 DASD devices. This new support is designed to enable you to specify five-digit device numbers in RMF data gathering and reporting options whereby the first digit of the five-digit device number represents the ID of the subchannel set ID to which the device is physically configured. Additionally, RMF device and storage subsystem reporting is designed to report five-digit device numbers.

The ability for user mount of file systems has been enhanced to enable select users to mount file systems in a privileged way (without NOSETUID).

Enhanced wildcard support for jobname on PORT and PORTRANGE statements: The ability to use wildcard characters when specifying jobnames on TCP/IP port reservation specifications is enhanced to enable specification of single-character wildcards and to use wildcard characters in any position in the jobname.

z/OS Communications Server supports enhanced system symbols: TCP/IP profile, System Resolver, OMPROUTE, CSSMTP, and VTAMLST; and other networking configuration files that support z/OS system symbols can use z/OS system symbols that contain underscores.

New function is added to the Common Event Adapter (CEA) TSO launcher to specify the target system within a SYSPLEX. When the system name is specified, the TSO address space is launched on the target system and the data is returned to the requesting system.

A new SDSF function displays information about the JES2 JCL PROCLIB and z/OS Dynamic Exits. This support is also available on z/OS V2.2 with the PTFs for APARs PI64206, PI64210, and PI68831.

New support in SCRT is added to enable ISVs licensed for support to generate an ISV-unique SCRT report. SCRT is included as a component of z/OS.

XCF System Status Detection (SSD) partitioning protocol function and the related SSD partitioning protocol healthcheck supplied with IBM Health Checker for z/OS are enhanced. The enhancements include:

- Improved health check reporting on the status of the SSD protocol environment requirements on a system
- Expanded health check reporting to include the connection status of the local system to all active CPC system images in the sysplex
- Support for recognizing dynamic central processor complex (CPC) name changes within the sysplex and updating the SSD partitioning protocol definitions without requiring an IPL of a z/OS image

The z/OSMF files and data sets REST API allows manipulation of UNIX (zFS) files, file systems, and z/OS data sets. z/OS V2.3 improves the z/OSMF files and data sets REST API to handle large files and data sets, serialization using enqueue and dequeue, toleration of migrated data sets, and other additional functionality. New function is added to handle DFSMShsm migrated data sets, editing large data sets efficiently, and adding support for pessimistic locking (data set enqueues and ISPF member enqueues). This support is also available on z/OS V2.2 with the PTF for APAR PI52426.

The InfoPrint Central component of InfoPrint Server adds a search capability for multiple forms using limited prefixes and wildcards. This enables users to search for documents that have more than one form name.

InfoPrint Server IP Printway Automatic Printer Failover has been added, which provides automatic failover to a specified alternative printer if the primary printer is offline.

A new CIM server configuration, maxRepositoryBackups, has been added to configure the number of repository backups that can be kept in the file system as well as a mechanism to automatically delete the old repository backups. Note that JMPI support is now removed and the CIM server has been updated to Open Pegasus 2.14.

Health Checker for z/OS is enhanced to support PARMLIB filtering using SYSTEM and SYSPLEX names. This support is also available on z/OS V2.2 with APAR OA49807.

z/OS Workload Management (WLM) is enhanced with an option to cap a system to the MSU value that is specified as the soft cap limit regardless of the four-hour rolling average consumption. An IBM zEC12 (GA2), or higher, server is required. Absolute MSU capping is also available on z/OS V2.2 and z/OS V2.1 with PTFs for APAR OA49201.

z/OS UNIX System Services supports dynamic installation exits for its callable services. z/OS UNIX callable services, sometimes referred to as *syscalls*, can be individually enabled to call installation exits both before the entry and after the exit of the callable service. Installation exit routines can be dynamically added, deleted, and modified through the use of the z/OS Dynamic Exits Facility. Unlike z/OS UNIX process exits, callable service exit routines are allowed to call other z/OS UNIX callable services from within the exit routine. This enhancement enables customers to implement callable service-level usage policies, resource auditing, and recovery routines along with a host of other possibilities.

z/OS V2.3 allows dynamic change of aggregate attributes for zFS so common MOUNT options can be changed dynamically without the overhead of unmounting and remounting the file system. Also, changing sysplex sharing status (RWSHARE/NORWSHARE) dynamically is allowed.

z/OS Workload Management provides a control that allows service classes to be defined such that their specialty processor eligible work will not execute on general purpose processors. In addition, WLM resource groups are enhanced to limit the amount of real storage that may be used by the associated service classes. In particular for workloads that exploit this function, such as Apache Spark workloads, this capability provides the ability to specify that all the applications or jobs submitted to a particular Spark cluster do not exceed a specified real memory limit, and that they do not receive help from standard processors when the zIIP capacity is exceeded. For z/OS V2.2, the support is delivered with the PTFs for APARs OA51171 (RSM), OA50953 (Supervisor), OA50845 (WLM/SRM), OA50760 (RMF), and PI71118 (zOSMF). For z/OS V2.1, the support is delivered with the PTFs for APARs OA51171 (RSM), OA50953 (Supervisor), OA50845 (WLM/SRM), OA50760 (RMF), and z/OSMF V2.1 with APAR PI71084 (zOSMF).

zFS allows for the monitoring of important events in the System Management Facility (SMF). Examples of such events are dynamic growing of an aggregate and disablement of an aggregate. zFS uses record type 92, which is also used by z/OS UNIX System Services. In addition, general performance indicators, that is, the information that is currently shown in various MODIFY ZFS, QUERY operator commands, can also be stored. This gives you the ability to look back in time at the performance of zFS on the system.

The DFS/SMB server can be configured to start with all daemons in the DFS Server Address space or with the DFSKERN daemon in its own address space. z/OS V2.3 provides a method for the DFSKERN started task name to be configurable to allow for corporate naming conventions when running the DFSKERN daemon in its own

address space. This support is also available on z/OS V2.1 and z/OS V2.2 with the PTF for APAR OA50424.

To aid in the migration of data from HFS file systems to zFS file systems, a new facility is provided that no longer requires the source file system (HFS) to be unmounted. This is useful in environments where an application outage is not acceptable. A new command is available that invokes the facility from TSO or the z/OS UNIX shell environment. Files that are in use during the migration process are automatically and transparently moved to the target file system. This new function will be available with APAR OA53128 in fourth quarter 2017.

A new directory called */global* in the sysplex root is introduced in z/OS V2.3. This new directory can be used by clients as a mount point for a file system that could contain files whose content needs to be consistent across the multiple systems of the sysplex or as a convenient location to provide a view of multiple levels of program products (not shipped as part of z/OS), even though the product may be installed on only one member of the sysplex. This does not change where program products are installed.

In z/OS V2.3 with file system sharing (sysplex support), version root will now be unmounted if not being used by any system in the sysplex.

z/OS now includes a copy of the IBM WebSphere Liberty for z/OS application server as an element of z/OS. It is licensed for use by approved products and other z/OS elements to reduce the number of instances of WebSphere Liberty that must be maintained. IBM supports this new WebSphere Liberty element in conjunction with the other elements of z/OS that use it. However, this copy of WebSphere Liberty for z/OS is also available for customer use. Such use is nonsupported and limited to nonproduction purposes on z/OS as outlined in z/OS Licensed Program Specifications.

Networking

z/OS V2.3 Communications Server is planned to include HiperSockets™ Converged Interface (HSCI) support as a post-GA deliverable in first quarter 2018 with the PTFs for APARs OA53198 and PI83372. HSCI support provides the following benefits:

- Linux™ on z Systems™ Layer 2 and z/VM® VSwitch Bridge compatibility: Clients prefer the administrative and operational advantages when configuring Linux guests with a single IP interface using a z System layer 2 configuration. The usability advantages are extended by the z/VM VSwitch bridge support, allowing Linux guests to configure a single IP interface for HiperSockets (HS), providing both internal CPC and external LAN communications. The current z/OS HS support only provides layer 3 connectivity, which is incompatible with this Linux and z/VM environment. The new z/OS V2.3 HSCI support resolves this issue by providing compatibility for both HS Layer 2 and Linux guests using HS with the z/VM VSwitch bridge.
- Improved ("hands free") HS usability for z/OS environments: HSCI transparently "converges" a HS interface with your OSA interface, providing transparent and dynamic usage of HS. With the HSCI enhancement:
  - Access to HS is achieved without requiring the z/OS network administrator to configure, provision, or operate an HS interface.
  - A z/OS instance can be relocated to another CPC without making any HS definition changes or taking any operator actions to access HS on the new CPC. Your external LAN is re-created within each CPC providing a single seamless LAN topology within your data center. When your OSA interface is restarted on the new z/OS location, your HSCI is dynamically reestablished.

z/OS V2.3 provides new support for fast, low-latency TCP/IP traffic between LPARs within a CPC using the Shared Memory Communications - Direct Memory Access (SMC-D) software protocol over firmware-provided Internal Shared Memory (ISM) devices. SMC-D is expected to provide substantial performance, throughput, response time, and CPU consumption benefits compared to standard TCP/IP

communications over HS. This support is also available on z/OS V2.2 with the PTFs for APARs OA48411 and PI45028.

In z/OS V2.3, Communications Server provides a new VTAM(R) start option that enables improved user control of the default VTAM Internal Trace (VIT) options. Previously, a set of VIT options (API, PIU, SSCP, NRM, MSG, and CIO) was always active and could not be disabled. The VITCTRL start option allows the enablement of a new "VIT Control" mode that provides the user with the capability of enabling and disabling any VIT option independently. While this capability is provided, it continues to be IBM's recommendation that the standard VIT options remain enabled to provide first-failure data capture capability for problem diagnosis. This VIT control capability is also available on z/OS V2.1 and z/OS V2.2 with the PTF for APAR OA50271.

Application development

IBM SDK for Java™ 8 SR5 provides the following enhancements:

- Pauseless Garbage Collection (GC) delivering more consistent response times for large heap, response-time-sensitive applications, by reducing GC stop-the-world pause times through exploitation of z14's Guarded Storage Facility. This new mode is an extension to existing GenCon GC policy, enabled through -Xgc:concurrentScavenge. This function requires a z14 processor and either z/OS V2.2 with the PTF for APAR OA51643 or z/OS V2.3.
- IBM Java for z/OS will exploit RMODE64 to place JIT code cache above the bar, enabled by default in IBM SDK for z/OS, Java Technology Edition, Version 8.0.5 (IBM Java for z/OS V8 SR5).
- Performance and features:
  - General throughput, footprint, and CPU usage / ramp-up improvements for Liberty and analytics workloads

In z/OS V2.3, DFSORT provides the capability to produce sorted or merged Unicode data records for output. This support enables users to SORT/MERGE Unicode Data with length of 1 - 450 Unicode characters for UTF-8, UTF-16, and UTF-32 format data. These enhancements give DFSORT users the added flexibility to SORT and MERGE Unicode data according to specific collation rules in the same manner that EBCDIC and ASCII data is today.

z/OS V2.3 eliminates the need for Generation Data Group (GDG) Bias usermod. Device Allocation is designed to optionally maintain the relationship between relative and absolute generations of a GDG on a job-step basis in addition to a job basis to improve the usability of JCL job restart processing.

REXX support for the z/OS Client Web Enablement Toolkit provided in z/OS V2.3. REXX applications are enabled to easily access the functions provided in the first release of the toolkit (both JSON parser and HTTP/HTTPS functions) in a REXX-intuitive manner. This expands the reach of the toolkit to the many users on the z/OS platform that prefer the ease of the REXX programming language.

The Sonoran, Data1, and APL2(R) fonts, which are currently provided in products 5771-ABA, 5771-ABB, 5771-ADA, 5771-ADB, 5771-ADW, 5771-ADX, 5771-AFL, and 5771-AFN, are included in the z/OS V2.3 Font Collection element. These fonts are functionally stabilized and no future enhancements are planned. Including them in z/OS is intended to make it unnecessary to order and install them separately.

Web Toolkit: Toolkit Data Streaming / Large Data Send and Receive. The Web Enablement Toolkit is a native component of z/OS that supports secure JSON REST client invocations. Support in z/OS V2.3 is designed to stream large amounts of data efficiently, which could be a method for accessing cloud-based data.

z/OS V2.3 delivers Real-Time SMF Analytics infrastructure support, which provides a durable, scalable in-memory infrastructure for SMF data that reduces the time it takes to get from raw data to operational insight. It enables faster processing for high-volume SMF data and provides the response time required for real-time

analysis of SMF data in analytics and cloud applications. This support is also available on z/OS V2.2 with the PTF for APAR OA49263.

XML System Services is enhanced in support of COBOL for reducing split records. This support is also available on z/OS V2.2 with the PTF for APAR OA49622.

z/OSMF supports workflow extensions for IBM Cloud Provisioning and Management for z/OS. This includes improvements to jobname creation, job card attributes, REST workflow steps, and a Workflow Editor.

New enhancements for email include:

- New interface to the email client through a REST API in z/OSMF called *notification*.
- As previously announced, the sendmail daemon is removed from z/OS, but a new sendmail to CSSMTP bridge is designed to provide a compatible subset of sendmail functions so that z/OS UNIX users can still use the sendmail command to send mail messages with the CSSMTP application. The sendmail to CSSMTP bridge is available on version 2.1 and version 2.2 with the PTF for APAR PI71175.
- New support is added to SAF/RACF to convert a user ID to an email address and vice versa. JES2 job notification is enhanced to allow the specification of email in addition to the existing NOTIFY support through local send.

New support in JES2 enables email notification to a user in addition to the current immediate notification when the user is logged on. Otherwise, notification is deferred until the user does log on. With this support, notifications can be issued to multiple email addresses and filtered based on job return codes.

Support is added to JES2 to allow specification of the user using an email address stored in SAF.

RACF allows the specification of an email address in the user profile. z/OSMF, for example, can send email notifications to users based on the email address associated with the RACF user ID.

The DFSORT E15 and E35 user exits allow transfer blocks of records as input to DFSORT for sorting and receiving blocks of sorted records as output, which avoids parsing the record blocks and processing each record separately. This support reduces the number of calls to the E15 and E35 user exits and reduces excessive transfer of records between user storage and DFSORT storage, allowing for possible performance improvements due to the accelerated throughput of the records. The new function is also available on z/OS V2.1 and z/OS V2.2 with the PTF for APAR PI47000.

JES2 job group enhancements are added to specify a job group level notification, job group output descriptors, and more flexible scheduling of job groups.

For JES2 in z/OS V2.3, JCL simplification and improvements are made. The DLM keyword on SYSIN is extended from 2 characters to 18 characters to provide more granularity. Two new JCL symbolics are added for the current job name and the current job number.

The getaddrinfo (BPX1GAI/BPX4GAI) API in z/OS Communications Server is updated in z/OS V2.3. The updates are intended to comply with RFC 3493 and the Single UNIX specification version 3.

z/OSMF REST JOBS API supports active step information and JES2 JOBGROUPs as well. This support is also available on z/OS V2.2 with the PTF for APAR PI57523.

z/OS V2.3 XL C/C++ provides enhancements in the following areas:

- Usability:
  - Metal C creates new function pointers that can act on environments as well as calling a function to allow similar coding patterns and automatic environment-based calling.

  - Hexadecimal offsets are provided for structure listings. The layout information can then be better compared and analyzed.
  - The DSECT utility creates C structures/unions that align closer to the original assembler DSECT, to give the same size and member offsets as the original DSECT.
  - Exploitation of new z14 instructions; for example, new ARCH(12) and TUNE(12) support exploits new instructions on the z14 processors, including support for the vector float type.
- Performance: The architecture default is changed to ARCH(10) (zEC12) to align with the minimum hardware level that z/OS V2.3 supports.
- Security: Stack protection to protect buffers that are susceptible to overflow and to stop returning from functions that detect overwriting.
- Debugging:
  - Metal C debug data blocks provide information linking the assembly or objects with the debugging data, providing synchronization of these files.
  - The Saved Option String Information (SOSINFO) utility emits options encoded in the PPA blocks to help in diagnosing problems.
  - DWARF debugging information in object files is added to the executable in an area that is not loaded at run time to allow access to both the debug data and executable code within the same file. The dbx utility supports this feature.

z/OS support for Z

Java 8 SR5 supports z9(R) or newer processors.

z/OS V2.3 with IBM z14 requires a minimum of 8 GB of memory. When running as a z/VM guest or on a IBM System z(R) Personal Development Tool, a minimum of 2 GB is required for version 2.3. If the minimum is not met, a warning WTOR will be issued at IPL. Continuing with less than the minimum memory could impact availability. A migration health check will be introduced at version 2.1 and version 2.2 to warn if the system is configured with less than 8 GB.

IBM zHyperLink Express(R), a new short distance Z I/O adapter introduced on z14, is designed to offer extremely low latency connectivity to FICON(R) storage systems. zHyperLink can improve application response time, cutting I/O-sensitive workload response time by up to 50% without requiring application changes. z/OS will optimize I/O performance by selectively utilizing zHyperLink Express or FICON paths to the storage system. IBM DB2 V12 for z/OS with APAR PI82575 will use zHyperLinks to reduce the elapsed time that transactions wait for random database read I/O, when the page is resident in the DASD cache. Customers can expect improved transaction response times as well as throughput and concurrency improvements from DB2's use of zHyperLinks in these scenarios. DB2 for z/OS zHyperLink support delivers additional value for modern workloads, which tend to drive more random data access patterns as compared to traditional workloads.

The z/OS V2.3 real storage manager (RSM) supports a new asynchronous memory clear operation to clear the data from 1M page frames using I/O processors (SAPs) on z14 processors. This is designed to eliminate the CPU cost for this operation and help improve performance of RSM first reference page fault processing and of system services such as IARV64 and STORAGE OBTAIN.

z/OS V2.3 Communications Server provides support for OSA-Express6S and RoCE Express2. z/OS V2.1 and V2.2 support is also provided for both adapters with PTFs.

z/OS V2.3 provides support for the new Instruction Execution Facility on z14 processors.

z/OS V2.3 provides RMF support for IBM Virtual Flash Memory, the replacement for Flash Express. This is also available on z/OS V2.1 and z/OS V2.2 with the PTF for APAR OA50761.

z/OS Supervisor provides services to use the z14 Guarded Storage Facility (GSF). Java GSF exploitation improves performance during garbage-collection.

z14 HiperDispatch optimizations include z/OS Supervisor and PR/SM™ hypervisor I/O synergies to improve I/O responsiveness.

z/OS WLM enhances memory-intensive applications to preferentially use the same common cache across workload balancing intervals. z/OS WLM enhances compute-intensive applications to preferentially be subdivided across processors sharing common caches.

See the z14 DEVICE3906 PSP Bucket, dated July 17, 2017, for the z/OS software requirements of the following z14 features and capabilities:

- FICON Express16S+ (CHPID type FC) when utilizing FICON or Channel-To-Channel (CTC), requires at a minimum:
  - z/OS V2.3
  - z/OS V2.2 with PTFs
  - z/OS V2.1 with PTFs
  - z/OS V1.13 (compatibility only, extended support contract for IBM Software Support Services for z/OS required)
- FICON Express16S+ (CHPID type FC) for support of zHPF single-track operations requires at a minimum:
  - z/OS V2.3
  - z/OS V2.2 with PTFs
  - z/OS V2.1 with PTFs
  - z/OS V1.13 (compatibility only, extended support contract for IBM Software Support Services for z/OS required with PTFs)
- FICON Express16S+ (CHPID type FC) for support of zHPF multitrack operations requires at a minimum:
  - z/OS V2.3
  - z/OS V2.2 with PTFs
  - z/OS V2.1 with PTFs
  - z/OS V1.13 (compatibility only, extended support contract for IBM Software Support Services for z/OS required with PTFs)
- OSA-Express6S GbE LX and GbE SX require at a minimum:
  - CHPID type OSD:
    - z/OS V2.3
    - z/OS V2.2
    - z/OS V2.1
    - z/OS V1.13 (compatibility only, extended support contract for IBM Software Support Services for z/OS required)
  - CHPID type OSD without maximum port exploitation (one port on the PCIe adapter is available for use):
    - z/OS V2.3
    - z/OS V2.2
    - z/OS V2.1
    - z/OS V1.13 (compatibility only, extended support contract for IBM Software Support Services for z/OS required)
- OSA-Express6S 10 GbE LR and 10 GbE SR require at a minimum:
  - CHPID type OSD:
    - z/OS V2.3
    - z/OS V2.2
    - z/OS V2.1
    - z/OS V1.13 (compatibility only, extended support contract for IBM Software Support Services for z/OS required)

  - CHPID type OSX for access control to the intra-ensemble data network (IEDN) from IBM z14 to Unified Resource Manager functions:
    - z/OS V2.3
    - z/OS V2.2
    - z/OS V2.1
    - z/OS V1.13 (compatibility only, extended support contract for IBM Software Support Services for z/OS required)
- OSA-Express6S 1000BASE-T Ethernet requires at minimum:
  - CHPID type OSC supporting TN3270E and non-SNA DFT:
    - z/OS V2.3
    - z/OS V2.2
    - z/OS V2.1
    - z/OS V1.13 (compatibility only, extended support contract for IBM Software Support Services for z/OS required)
  - CHPID type OSD with exploitation of two ports per CHPID:
    - z/OS V2.3
    - z/OS V2.2
    - z/OS V2.1
    - z/OS V1.13 (compatibility only, extended support contract for IBM Software Support Services for z/OS required)
- Crypto Express6S Toleration, which treats Crypto Express6S cryptographic coprocessors and accelerators as Crypto Express5 coprocessors and accelerators, requires at a minimum:
  - z/OS V2.3 with PTFs
  - z/OS V2.2 with PTFs or:
    - z/OS V2.2 with Cryptographic Support for z/OS V1R13 -z/OS V2R2 (HCR77B1) with PTFs, or
    - z/OS V2.2 with Cryptographic Support for z/OS V2R1 -z/OS V2R2 (HCR77CO) with PTFs
    - z/OS V2.1 with PTFs, or
    - z/OS V2.1 with Cryptographic Support for z/OS V1R13 -z/OS V2R1 (HCR77A1) with PTFs or
    - z/OS V2.1 with Enhanced Cryptographic Support for z/OS V1R13 -z/OS V2R1(HCR77B0) with PTFs or
    - z/OS V2.1 with Cryptographic Support for z/OS V1R13 -z/OS V2R2 (HCR77B1) with PTFs or
    - z/OS V2.1 with Cryptographic Support for z/OS V2R1 -z/OS V2R2 (HCR77CO) with PTFs
- Crypto Express6S support of VISA Format Preserving Encryption requires at a minimum:
  - z/OS V2.3
  - z/OS V2.2
  - z/OS V2.1 with the Enhanced Cryptographic Support for z/OS V1R13-z/OS V2R1(HCR77B0) web deliverable installed
- Crypto Express6S support of greater than 16 domains requires at a minimum:
  - z/OS V2.3
  - z/OS V2.2
  - z/OS V2.1 with the Enhanced Cryptographic Support for z/OS V1R13-z/OS V2R1(HCR77B0) web deliverable installed
- Crypto Express6S Exploitation requires at a minimum:
  - z/OS V2.1 with Cryptographic Support for z/OS V2R1 -z/OS V2R3 (HCR77C1)
  - z/OS V2.2 with Cryptographic Support for z/OS V2R1 -z/OS V2R3 (HCR77C1)

  - z/OS V2.3 with Cryptographic Support for z/OS V2R1 -z/OS V2R3 (HCR77C1)
- Crypto Express6S support of PCI-HSM compliance requires at a minimum:
  - z/OS V2.1 with Cryptographic Support for z/OS V2R1 -z/OS V2R3 (HCR77C1)
  - z/OS V2.2 with Cryptographic Support for z/OS V2R1 -z/OS V2R3 (HCR77C1)
  - z/OS V2.3 with Cryptographic Support for z/OS V2R1 -z/OS V2R3 (HCR77C1)
- 10 GbE RoCE Express2 for Shared Memory Communications - Remote DirectMemory Access (SMC-R) requires at a minimum:
  - z/OS V2.3
  - z/OS V2.2 with PTFs
  - z/OS V2.1 with PTFs
- IBM Integrated Coupling Adapter Fanout (ICA SR) requires at a minimum:
  - z/OS V2.3
  - z/OS V2.2
  - z/OS V2.1 with PTFs
  - z/OS V1.13 (compatibility only, extended support contract for IBM Software Support Services for z/OS required with PTFs)
- Support for 256 Coupling CHPIDs requires at a minimum:
  - z/OS V2.3
  - z/OS V2.2
  - z/OS V2.1 with PTFs
  - z/OS V1.13 (compatibility only, extended support contract for IBM Software Support Services for z/OS required with PTFs)
- Coupling Express LR requires at a minimum:
  - z/OS V2.3
  - z/OS V2.2 with PTFs
  - z/OS V2.1 with PTFs
  - z/OS V1.13 (compatibility only, extended support contract for IBM Software Support Services for z/OS required with PTFs)
- CF Scalability Enhancements requires at a minimum:
  - z/OS V2.3
  - z/OS V2.2 with PTFs
  - z/OS V2.1 with PTFs
  - z/OS V1.13 (compatibility only, extended support contract for IBM Software Support Services for z/OS required with PTFs)
- CF List Notification Enhancements requires at a minimum:
  - z/OS V2.3
  - z/OS V2.2 with PTFs
  - z/OS V2.1 with PTFs
- zHyperLink Express (#0431) requires at a minimum:
  - z/OS V2.3 with PTFs
  - z/OS V2.2 with PTFs
  - z/OS V2.1 with PTFs
- IBM Virtual Flash Memory (VFM) requires at a minimum:
  - z/OS V2.3.
  - z/OS V2.2.
  - z/OS V2.1.
  - z/OS V1.13 with PTFs, the z/OS V1.13 RSM Enablement Offering web deliverable installed, and an extended support contract for IBM Software Support Services. The web deliverable is available at the z/OS downloads website.

- XL C/C++ support of ARCH(12) and TUNE(12) parameters requires at a minimum:
  - z/OS V2.3 with PTFs
- Guarded Storage requires at a minimum:
  - z/OS V2.3
  - z/OS V2.2 with PTFs
- Instruction Execution Protection Facility requires at a minimum:
  - z/OS V2.3
  - z/OS V2.2 with PTFs

z/OS V2.3 exploits an IBM DS8000(R) interface for z/OS environments, as announced in Hardware Announcement 116-044, dated May 31, 2016, that will release any extents on a thinly provisioned extent space-efficient (ESE) volume that only contains empty space. Thin provisioning with ESE volumes in z/OS environments is designed to simplify storage configurations and management by standardizing device sizes without wasting space and to reduce replication and tiering overheads by avoiding movement of unallocated extents. Additionally, spare storage capacity across sysplexes or between storage groups potentially can be shared. A new DFSMSdss space release command, SPACEREL, exploits the DS8000 interface, and a new RACF FACILITY class profile is supported to protect the new SPACEREL command. This function is available on z/OS V2.1 and V2.2 with PTFs for OA50675.

RMF support is provided to collect SMC-D related performance measurements in SMF 73 Channel Path Activity and SMF 74 subtype 9 PCIE Activity records and provide these measurements in the RMF Postprocessor and Monitor III PCIE and Channel Activity reports. This support is also available on z/OS V2.2 with PTF UA80445 for APAR OA49113.

z/OS V2.3 support for parallel sysplex on z14 including:

- Enhancements in CF processor scalability
- CF List Notification Enhancements
- Coupling Express LR coupling links
- New level of the Coupling Facility Control Code (CFCC), CFLEVEL 22, provided by the z14
- Increased numbers of ICA SR coupling links per CEC for scalability and constraint relief

Accessibility by people with disabilities

A US Section 508 Voluntary Product Accessibility Template (VPAT) containing details on accessibility compliance can be found on the Product accessibility information website.

Section 508 of the US Rehabilitation Act

IBM z(TM)/OS V2.3 is capable as of September 29, 2017, when used in accordance with IBM's associated documentation, of satisfying the applicable requirements of Section 508 of the Rehabilitation Act, provided that any assistive technology used with the product properly interoperates with it. A US Section 508 Voluntary Product Accessibility Template (VPAT) can be requested at the Product accessibility information website.

Product positioning

Product positioning - Globalization

Standards

z/OS Version 2 is designed to continue to meet a number of important standards. In addition to maintaining previously announced support in z/OS Version 1 for a number of industry standards such as RFCs and PCI-DSS, and adding support for a number of additional standards in z/OS V2.1, these include:

- z/OS Version 1 earned the IPv6 Phase 2 Ready logo and USGv6 Profile Version 1.0 (NIST SP500-267) certification. z/OS V2.3 Communications Server is designed to meet these standards.
- The programming interfaces provided by z/OS V2.3 Unicode Services are designed to meet the Unicode 9.0 standard.
- IBM z/OS V2.1 has been certified as meeting the requirements of the German Common Criteria Certification Body (BSI) Operating System Protection Profile (OSPP) at EAL 4+.
- IBM plans to pursue an evaluation to the Federal Information Processing Standard (FIPS) 140-2 using National Institute of Standards and Technology's (NIST) Cryptographic Module Validation Program (CMVP) for the System SSL component of the Cryptographic Services element of z/OS. This is intended to help satisfy the need for FIPS 140-2 validated cryptographic functions when using z/OS Communications Server capabilities such as AT-TLS and protocols such as TN3270 and FTP when secured using AT-TLS.
- IBM also plans to pursue an evaluation to the Federal Information Processing Standard (FIPS) 140-2 using National Institute of Standards and Technology's (NIST) Cryptographic Module Validation Program (CMVP) for the ICSF component of the Cryptographic Services element of z/OS. This is intended to help satisfy the need for FIPS 140-2 validated cryptographic functions by various IBM software products and customer applications running on z/OS.

Statement of direction

z/OS V2.3 is planned to be the last release of the operating system to provide national language translation in languages other than Japanese. As such, the handful of z/OS elements that provide message and panel translation to Chinese (Simplified and Traditional), Danish, Dutch (Netherlands), French (including Canadian French), German (including Swiss German), Italian, Korean, Norwegian, Portuguese (Brazilian), Spanish, and Swedish today, will no longer provide translations into these languages in the release after z/OS V2.3.

Network File System (NFS) is the strategic file sharing protocol for z/OS. The DFS/SMB (Distributed File System / Server Message Block) functionality has been stabilized. DFS/SMB is expected to continue shipping as part of the operating system and will be supported in accordance with the terms of a customer's applicable support agreement. IBM intends to continue enhancing the NFS functionality, including RAS and performance capabilities, in future z/OS releases. All requirements for file sharing with z/OS are expected to be addressed in the context of NFS only.

z/OS V2.3 is planned as the last release to include the z/OS BookManager(R) READ and Library Server base elements, the latter of which includes the BookRead API. Over time, IBM's platform for delivering product documentation to customers has evolved to IBM Knowledge Center technology, and production of documentation formats that are supported by BookManager Read and Library Server has greatly diminished. IBM recommends now using IBM Knowledge Center for z/OS (KC4z), which was introduced as a base element of z/OS in version 2.2, to maintain local repositories of product documentation and serve content.

Removal of support of YES setting for VSM ALLOWUSERKEYCSA DIAGxx parmlib parameter: z/OS V2.3 will be the last release of z/OS to support the YES setting for the ALLOWUSERKEYCSA DIAGxx parmlib parameter. If you run any software that requires the setting of this parameter to YES, the software will need to be changed to no longer require the setting of this parameter to YES. All IBM provided software should not require this setting. If you have any other non-IBM provided software that requires this setting, contact the owner of the software regarding this usage.

Removal of support for obtaining user key CSA/ECSA storage: z/OS V2.3 will be the last release of z/OS to support the usage of the GETMAIN, CPOOL, and STORAGE OBTAIN interfaces to obtain user key (8-15) CSA/ECSA storage. If you have any software that obtains user key CSA/ECSA storage, the software will need to be changed to no longer require this capability.

Removal of support for changing ESQA storage to user key: z/OS V2.3 will be the last release of z/OS to support the usage of the CHANGKEY interface to change ESQA storage to user key (8-15). If you have any software that changes ESQA storage to user key, the software will need to be changed to no longer require this capability.

Removal of support for creating SCOPE=COMMON data spaces in user key: z/OS V2.3 will be the last release of z/OS to support the usage of the DSPSERV CREATE interface to create a SCOPE=COMMON data space in user key (8-15). If you have any software that creates a SCOPE=COMMON data space in user key, the software will need to be changed to no longer require this capability.

IBM intends to deliver VSAM exploitation of z14 and DS8880 zHyperLink Express(R). zHyperLink Express is a short distance mainframe attach link designed for up to 10x lower latency than High Performance FICON(R).

For several decades, z/OS has offered two spooling subsystems: JES2 (formerly HASP) and JES3 (formerly ASP). JES2 is used by the majority of z/OS customers and has evolved into nearly a superset of functionality over JES3. IBM is affirming that JES2 is the strategic Job Entry Subsystem for z/OS. New function in spooling subsystems will be primarily developed only for JES2. JES2 supports unique features in the area of availability such as spool migration, online merging of spool volumes, and in the area of function such as support for email notification when a job completes and soon in the area of security with encryption of spool data.

JES3 continues to be supported and maintained with its current function.

IBM's statements regarding its plans, directions, and intent are subject to change or withdrawal without notice at IBM's sole discretion. Information regarding potential future products is intended to outline our general product direction and it should not be relied on in making a purchasing decision. The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code, or functionality. Information about potential future products may not be incorporated into any contract. The development, release, and timing of any future features or functionality described for our products remain at our sole discretion.

Hardware and software support services

SmoothStart/installation services

IBM SmoothStart Services and Installation Services are not provided.

Reference information

Hardware Announcement 117-044, dated July 17, 2017(IBM z14)

Hardware Announcement 115-001, dated January 14, 2015(IBM z13)

Hardware Announcement 115-001, dated January 14, 2015(IBM z13s)

Hardware Announcement 112-155, dated August 28, 2012(IBM zEnterprise EC12)

Hardware Announcement 113-121, dated July 23, 2013(IBM zEnterprise BC12)

Software Announcement 217-323, dated July 17, 2017(IBM Enterprise COBOL for z/OS, V6.2)

Software Announcement 217-352, dated July 17, 2017(IBM Enterprise PL/I for z/OS, V5.2)

Software Announcement 217-217, dated July 17, 2017(IBM Enterprise PL/I Value Unit Edition for z/OS)

Software Announcement 215-009, dated January 14, 2015(IBM Ported Tools for z/OS, V1.3.0)

Software Announcement 216-378, dated October 4, 2016(IBM DB2 12 for z/OS)

Availability of national languages

Translation information, if available, can be found at the Translation Reports website.

Program number

Program number	VRM	Program name
5650-ZOS	2.3	z/OS

Business Partner information

If you are a Direct Reseller - System Reseller acquiring products from IBM, you may link directly to Business Partner information for this announcement. A PartnerWorld(R) ID and password are required (use IBMid).

BP Attachment for Announcement Letter 217-246

Education support

Here is a partial list of courses that are currently available and planned for z/OS education:

Course code	Course title	Course type
ESC8G	z/OS 2.3 Review and Migration	Classroom
ESCS8G	z/OS 2.3 Review	Digital
ESE0G	BlockChain on z Systems™ 2	Classroom
ES05	Introduction to z/OS Environment	Classroom
ES10	Fundamental System Skills for z/OS	Classroom
ES15	z/OS Facilities	Classroom
ES27	z/OS System Operators	Classroom
ES41	z/OS Installation Using ServerPac	Classroom
ES54	Basic z/OS Tuning Using the Workload Manager (WLM)	Classroom
ES19	Basics of z/OS RACF(R) Administration	Classroom
OP05	Introducing z/OS UNIX™ System Services	Classroom

Course code	Course title	Course type
ES90	Advanced Parallel Sysplex(R) Operations and Recovery	Classroom
ES42	Parallel Sysplex Implementation Workshop	Classroom
ESB1	z/OS Management Facility Implementation and Use	Classroom
ES52	z/OS REXX Programming Workshop	Classroom

IBM training provides education to support many IBM offerings. Descriptions of courses for IT professionals and managers can be found on the IBM Skills Gateway website.

Call IBM training at 800-IBM-TEACH (426-8322) for catalogs, schedules, and enrollments.

[2] This course is planned to be available in August 2017.

Technical information

Specified operating environment

Hardware requirements

z/OS V2.3 runs on these Z servers:

- IBM z14
- IBM z13
- IBM z13s
- IBM zEnterprise EC12 (zEC12)
- IBM zEnterprise BC12 (zBC12)

Software requirements

The z/OS base is a system that can be IPLed. There are no software prerequisites in order to IPL. Specific functions may require additional products not included in the z/OS base or in the optional features of z/OS. See *z/OS V2R3 Planning for Installation* (GA32-0890) for a listing of specific software requirements.

Compatibility

Coexistence, release migration, and fallback

z/OS gives you compatibility and flexibility as you migrate systems in a multisystem configuration by allowing multiple releases of z/OS to coexist. This includes non-Parallel Sysplex and Parallel Sysplex multisystem configurations. Coexistence allows systems within a multisystem configuration to be upgraded to a new release level of z/OS one system at a time. This is contingent on the fact that the release you are migrating to can coexist with the lowest release running in your multisystem configuration.

Note: These statements represent the current intention of IBM. IBM reserves the right to change or alter the Coexistence-Migration-Fallback policy in the future or to exclude certain releases beyond those stated. IBM development plans are subject to change or withdrawal without further notice. Any reliance on this statement of direction is at the relying party's sole risk and does not create any liability or obligation for IBM.

IBM provides the following coexistence, migration, and fallback for z/OS V2.3:

IBM plans to support an n-2 approach, where three consecutive releases are planned to be supported for coexistence, fallback, and migration. For example, where "n"

is z/OS V2.3, IBM intends to allow you to upgrade from z/OS V2.2 directly to z/OS V2.3 with full coexistence, migration, and fallback support to maximize the value of your investment, and from z/OS V2.2 to z/OS V2.3 with full coexistence, migration, and fallback support.

Migration forward as well as fallback should be made within the same z/OS releases supported by the coexistence policy.

Table: Coexistence-Migration-Fallback for z/OS V2.3

Release	Coexistence-Migration-Fallback supported with release in Column 1
z/OS V2.1	z/OS V1.12, [3] z/OS V1.13, [4] z/OS V2.1
z/OS V2.2	z/OS V1.13, [4] z/OS V2.1, z/OS V2.2
z/OS V2.3	z/OS V2.1, z/OS V2.2, z/OS V2.3

[3] z/OS V1.12 end of service was September 30, 2014.

[4] z/OS V1.13 end of service was September 30, 2016.

This consistent coexistence, migration, and fallback policy applies to release migrations for all configurations, whether they are:

- Single system configurations
- Individual systems within a multisystem configuration
- Cases where a simultaneous IPL is used to migrate all systems in a multisystem configuration at the same time

License Metric Change

- z/OS V2 is only offered with NALC pricing for customers using NALC for z/OS, V1 who are using PSLC for their middleware programs. z/OS V2 customers using AWLC or WLC or AEWLC or EWLC pricing for their middleware programs must migrate from NALC to zNALC pricing.
- All z/OS customers using NALC pricing are encouraged to migrate to zNALC pricing to obtain the zNALC advantages such as sub-capacity pricing for z/OS with zNALC supported by the SCRT reports, lower prices above 45 MSUs, and aggregated pricing across qualified Parallel Sysplexes.

Planning information

Direct customer support

Direct customer support is provided by IBM Operational Support Services - SoftwareXcel Enterprise Edition or SoftwareXcel Basic Edition. These fee services can enhance your productivity by providing voice and electronic access into the IBM support organization. IBM Operational Support Services - SoftwareXcel Enterprise Edition or SoftwareXcel Basic Edition will help answer questions pertaining to usage, how-to, and suspected software defects for eligible products.

Installation and technical support is provided by IBM Global Services. For more information on services, call 888-426-4343.

To obtain information on customer eligibility and registration procedures, contact the appropriate support center.

Security, auditability, and control

Data security and auditability in the z/OS environment are enhanced by the functions available in the optional Security Server for z/OS feature.

The customer is responsible for evaluation, selection, and implementation of security features, administrative procedures, and appropriate controls in application systems and communication facilities.

Ordering information

To access all formats of the z/OS product documentation and other content, see the z/OS Internet Library.

New licensees

Orders for new licenses can be placed now.

This product is delivered in ServerPac and CBPDO. You choose the delivery method, physical media or internet, when ordering. See the Customized Offerings section for the available media types. Production of z/OS V2.3 orders will begin on the planned general availability date, September 29, 2017. Ship dates for orders will be based on order sequence, production capability, and the customer-requested arrival date. Due to the amount of customization of ServerPac orders, shipments will begin approximately two weeks after general availability. For CBPDO orders, shipments will begin one week after general availability. In all cases, no delivery commitments are to be made to the customer until confirmed arrival dates are in ESW.

Registered customers can access IBMLink for ordering information and charges. Shipment will not occur before the availability date, September 29, 2017.

New users of IBM z/OS V2.3 should specify: Type: 5650 Model: ZOS

Basic license

To order a basic license, specify the z/OS V2.3 program number 5650-ZOS. Proceed to select the features listed which are required and then select any optional features.

Parallel Sysplex license charge (PSLC)

Parallel Sysplex license charge (PSLC) basic license

To order a basic license, specify the program number and quantity of MSU.

If there is more than one program copy in a Parallel Sysplex, the charge for all copies is associated to one license by specifying the applicable PSLC license options and quantity represented by the sum of the Service Units in Millions (MSUs) in your Parallel Sysplex. For all other program copies, specify the System Usage Registration No-Charge (SYSUSGREG NC) Identifier on the licenses.

Entitlement identifier	Description	License option/Pricing metric
S01728S	z/OS V2 Alternate Base	Basic MLC, PSLC
S01728T	z/OS V2 Base	Basic MLC, PSLC
S01728V	z/OS V2 BDT FTF	Basic MLC, PSLC
S01728W	z/OS V2 BDT SNA NJE	Basic MLC, PSLC
S01728X	z/OS V2 BookManager Build	Basic MLC, PSLC
S01728Z	z/OS V2 XL C/C++	Basic MLC, PSLC
S017290	z/OS V2 DFSMS dss	Basic MLC, PSLC
S017291	z/OS V2 DFSMS dsshsm	Basic MLC, PSLC
S017292	z/OS V2 DFSMS rmm	Basic MLC, PSLC
S017293	z/OS V2 DFSMStvs	Basic MLC, PSLC
S017294	z/OS V2 DFSORT	Basic MLC, PSLC
S017295	z/OS V2 GDDM-PGF	Basic MLC, PSLC
S017296	z/OS V2 GDDM-REXX	Basic MLC, PSLC
S017297	z/OS V2 HCM	Basic MLC, PSLC
S017298	z/OS V2 HLASM Toolkit	Basic MLC, PSLC
S017299	z/OS V2 Infoprint Server	Basic MLC, PSLC
S01729B	z/OS V2 JES3	Basic MLC, PSLC

Entitlement identifier	Description	License option/Pricing metric
S01729C	z/OS V2 RMF™	Basic MLC, PSLC
S01729D	z/OS V2 SDSF	Basic MLC, PSLC
S01729F	z/OS V2 Security Server	Basic MLC, PSLC
S01780D	z/OS V2 zEDC	Basic MLC, PSLC

Advanced Workload License Charges (AWLC)

Advanced Workload License Charges (AWLC) basic license

To order a basic license, specify the program number and quantity of MSUs. If there is more than one program copy in a Parallel Sysplex, the charge for all copies is associated to one license by specifying the applicable AWLC license options and quantity represented by the sum of the Service Units in Millions (MSUs) in your Parallel Sysplex. For all other program copies, specify the System Usage Registration No-Charge (SYSUSGREG NC) Identifier on the licenses.

Program name: z/OS V2.3

Program PID: 5650-ZOS

Entitlement identifier	Description	License option/Pricing metric
S01728S	z/OS V2 Alternate Base	Basic MLC, AWLC
S01728T	z/OS V2 Base	Basic MLC, AWLC
S01728V	z/OS V2 BDT FTF	Basic MLC, AWLC
S01728W	z/OS V2 BDT SNA NJE	Basic MLC, AWLC
S01728X	z/OS V2 BookManager Build	Basic MLC, AWLC
S01728Z	z/OS V2 XL C/C++	Basic MLC, AWLC
S017290	z/OS V2 DFSMS dss	Basic MLC, AWLC
S017291	z/OS V2 DFSMS dsshsm	Basic MLC, AWLC
S017292	z/OS V2 DFSMS rmm	Basic MLC, AWLC
S017293	z/OS V2 DFSMStvs	Basic MLC, AWLC
S017294	z/OS V2 DFSORT	Basic MLC, AWLC
S017295	z/OS V2 GDDM-PGF	Basic MLC, AWLC
S017296	z/OS V2 GDDM-REXX	Basic MLC, AWLC
S017297	z/OS V2 HCM	Basic MLC, AWLC
S017298	z/OS V2 HLASM Toolkit	Basic MLC, AWLC
S017299	z/OS V2 Infoprint Server	Basic MLC, AWLC
S01729B	z/OS V2 JES3	Basic MLC, AWLC
S01729C	z/OS V2 RMF	Basic MLC, AWLC
S01729D	z/OS V2 SDSF	Basic MLC, AWLC
S01729F	z/OS V2 Security Server	Basic MLC, AWLC
S01780D	z/OS V2 zEDC	Basic MLC, AWLC

Advanced Entry Workload License Charges (AEWLC)

Advanced Entry Workload License Charges (AEWLC) basic license

To order a basic license, specify the program number and quantity of MSUs.

Program name: z/OS V2.3

Program PID: 5650-ZOS

Entitlement identifier	Description	License option/Pricing metric
S01728S	z/OS V2 Alternate Base	Basic MLC, AEWLC
S01728T	z/OS V2 Base	Basic MLC, AEWLC
S01728V	z/OS V2 BDT FTF	Basic MLC, AEWLC

Entitlement identifier	Description	License option/Pricing metric
S01728W	z/OS V2 BDT SNA NJE	Basic MLC, AEWLC
S01728X	z/OS V2 BookManager Build	Basic MLC, AEWLC
S01728Z	z/OS V2 XL C/C++	Basic MLC, AEWLC
S017290	z/OS V2 DFSMS dss	Basic MLC, AEWLC
S017291	z/OS V2 DFSMS dsshsm	Basic MLC, AEWLC
S017292	z/OS V2 DFSMS rmm	Basic MLC, AEWLC
S017293	z/OS V2 DFSMStvs	Basic MLC, AEWLC
S017294	z/OS V2 DFSORT	Basic MLC, AEWLC
S017295	z/OS V2 GDDM-PGF	Basic MLC, AEWLC
S017296	z/OS V2 GDDM-REXX	Basic MLC, AEWLC
S017297	z/OS V2 HCM	Basic MLC, AEWLC
S017298	z/OS V2 HLASM Toolkit	Basic MLC, AEWLC
S017299	z/OS V2 Infoprint Server	Basic MLC, AEWLC
S01729B	z/OS V2 JES3	Basic MLC, AEWLC
S01729C	z/OS V2 RMF	Basic MLC, AEWLC
S01729D	z/OS V2 SDSF	Basic MLC, AEWLC
S01729F	z/OS V2 Security Server	Basic MLC, AEWLC
S01780D	z/OS V2 zEDC	Basic MLC, AEWLC

Country Multiplex License Charges (CMLC)

Country Multiplex License Charges (CMLC) basic license

To order a basic license, specify the program number and quantity of MSUs.

If there is more than one program copy in a Country Multiplex, the charge for all copies is associated to one license if all the copies are licensed to one customer number within the multiplex. If there is more than one customer number, the charge for all copies is prorated to one license for each customer within the multiplex.

For each license being charged, specify the applicable CMLC license options and the prorated quantity of the Service Units in Millions (MSUs) for each customer number within the multiplex. For all other program copies, specify the Workload Registration No-Charge (WLREG NC) Identifier on the licenses.

Program name: z/OS V2.3

Program PID: 5650-ZOS

Entitlement identifier	Description	License option/Pricing metric
S01728S	z/OS V2 Alternate Base	Basic MLC, CMLC
S01728T	z/OS V2 Base	Basic MLC, CMLC
S01728V	z/OS V2 BDT FTF	Basic MLC, CMLC
S01728W	z/OS V2 BDT SNA NJE	Basic MLC, CMLC
S01728X	z/OS V2 BookManager Build	Basic MLC, CMLC
S01728Z	z/OS V2 XL C/C++	Basic MLC, CMLC
S017290	z/OS V2 DFSMS dss	Basic MLC, CMLC
S017291	z/OS V2 DFSMS dsshsm	Basic MLC, CMLC
S017292	z/OS V2 DFSMS rmm	Basic MLC, CMLC
S017293	z/OS V2 DFSMStvs	Basic MLC, CMLC
S017294	z/OS V2 DFSORT	Basic MLC, CMLC
S017295	z/OS V2 GDDM-PGF	Basic MLC, CMLC
S017296	z/OS V2 GDDM-REXX	Basic MLC, CMLC
S017297	z/OS V2 HCM	Basic MLC, CMLC
S017298	z/OS V2 HLASM Toolkit	Basic MLC, CMLC
S017299	z/OS V2 Infoprint Server	Basic MLC, CMLC

Entitlement identifier	Description	License option/Pricing metric
S01729B	z/OS V2 JES3	Basic MLC, CMLC
S01729C	z/OS V2 RMF	Basic MLC, CMLC
S01729D	z/OS V2 SDSF	Basic MLC, CMLC
S01729F	z/OS V2 Security Server	Basic MLC, CMLC
S01780D	z/OS V2 zEDC	Basic MLC, CMLC

Multiplex System z(R) New Application License Charge (MzNALC) Basic License

To order a basic license, specify the program number and quantity of MSUs.

Program name: z/OS V2.3

Program PID: 5650-ZOS

Entitlement identifier	Description	License option/Pricing metric
S01728S	z/OS V2 Alternate Base	Basic MLC, MzNALC
S01728T	z/OS V2 Base	Basic MLC, MzNALC
S01728V	z/OS V2 BDT FTF	Basic MLC, MzNALC
S01728W	z/OS V2 BDT SNA NJE	Basic MLC, MzNALC
S01728X	z/OS V2 BookManager Build	Basic MLC, MzNALC
S01728Z	z/OS V2 XL C/C++	Basic MLC, MzNALC
S017290	z/OS V2 DFSMS dss	Basic MLC, MzNALC
S017291	z/OS V2 DFSMS dsshsm	Basic MLC, MzNALC
S017292	z/OS V2 DFSMS rmm	Basic MLC, MzNALC
S017293	z/OS V2 DFSMStvs	Basic MLC, MzNALC
S017294	z/OS V2 DFSORT	Basic MLC, MzNALC
S017295	z/OS V2 GDDM-PGF	Basic MLC, MzNALC
S017296	z/OS V2 GDDM-REXX	Basic MLC, MzNALC
S017297	z/OS V2 HCM	Basic MLC, MzNALC
S017298	z/OS V2 HLASM Toolkit	Basic MLC, MzNALC
S017299	z/OS V2 Infoprint Server	Basic MLC, MzNALC
S01729B	z/OS V2 JES3	Basic MLC, MzNALC
S01729C	z/OS V2 RMF	Basic MLC, MzNALC
S01729D	z/OS V2 SDSF	Basic MLC, MzNALC
S01729F	z/OS V2 Security Server	Basic MLC, MzNALC
S01780D	z/OS V2 zEDC	Basic MLC, MzNALC

Variable Workload License Charge (VWLC)

Workload License Charge (WLC) Basic License

If there is more than one program copy in a Parallel Sysplex, the charge for all copies is associated to one license by specifying the applicable WLC license options and quantity represented by the sum of the Service Units in Millions (MSUs) in your Parallel Sysplex. For all other program copies, specify the Workload Registration Variable WLC Identifier on the licenses.

Entitlement identifier	Description	License option/Pricing metric
S01728S	z/OS V2 Alternate Base	Basic MLC, VWLC
S01728T	z/OS V2 Base	Basic MLC, VWLC
S01728V	z/OS V2 BDT FTF	Basic MLC, VWLC
S01728W	z/OS V2 BDT SNA NJE	Basic MLC, VWLC
S01728X	z/OS V2 BookManager Build	Basic MLC, VWLC
S01728Z	z/OS V2 XL C/C++	Basic MLC, VWLC
S017290	z/OS V2 DFSMS dss	Basic MLC, VWLC

Entitlement identifier	Description	License option/Pricing metric
S017291	z/OS V2 DFSMS dsshsm	Basic MLC, VWLC
S017292	z/OS V2 DFSMS rmm	Basic MLC, VWLC
S017293	z/OS V2 DFSMStvs	Basic MLC, VWLC
S017294	z/OS V2 DFSORT	Basic MLC, VWLC
S017295	z/OS V2 GDDM-PGF	Basic MLC, VWLC
S017296	z/OS V2 GDDM-REXX	Basic MLC, VWLC
S017297	z/OS V2 HCM	Basic MLC, VWLC
S017298	z/OS V2 HLASM Toolkit	Basic MLC, VWLC
S017299	z/OS V2 Infoprint Server	Basic MLC, VWLC
S01729B	z/OS V2 JES3	Basic MLC, VWLC
S01729C	z/OS V2 RMF	Basic MLC, VWLC
S01729D	z/OS V2 SDSF	Basic MLC, VWLC
S01729F	z/OS V2 Security Server	Basic MLC, VWLC
S01780D	z/OS V2 zEDC	Basic MLC, VWLC

Entry Workload License Charge (EWLC)

Entry Workload License Charge (EWLC) Basic License

To order a basic license, specify the program number and the quantity of MSUs.

Entitlement identifier	Description	License option/Pricing metric
S01728S	z/OS V2 Alternate Base	Basic MLC, EWLC
S01728T	z/OS V2 Base	Basic MLC, EWLC
S01728V	z/OS V2 BDT FTF	Basic MLC, EWLC
S01728W	z/OS V2 BDT SNA NJE	Basic MLC, EWLC
S01728X	z/OS V2 BookManager Build	Basic MLC, EWLC
S01728Z	z/OS V2 XL C/C++	Basic MLC, EWLC
S017290	z/OS V2 DFSMS dss	Basic MLC, EWLC
S017291	z/OS V2 DFSMS dsshsm	Basic MLC, EWLC
S017292	z/OS V2 DFSMS rmm	Basic MLC, EWLC
S017293	z/OS V2 DFSMStvs	Basic MLC, EWLC
S017294	z/OS V2 DFSORT	Basic MLC, EWLC
S017295	z/OS V2 GDDM-PGF	Basic MLC, EWLC
S017296	z/OS V2 GDDM-REXX	Basic MLC, EWLC
S017297	z/OS V2 HCM	Basic MLC, EWLC
S017298	z/OS V2 HLASM Toolkit	Basic MLC, EWLC
S017299	z/OS V2 Infoprint Server	Basic MLC, EWLC
S01729B	z/OS V2 JES3	Basic MLC, EWLC
S01729C	z/OS V2 RMF	Basic MLC, EWLC
S01729D	z/OS V2 SDSF	Basic MLC, EWLC
S01729F	z/OS V2 Security Server	Basic MLC, EWLC
S01780D	z/OS V2 zEDC	Basic MLC, EWLC

New Application License Charge (NALC)

New Application License Charge (NALC) ordering information

The NALC price is a price per MSU of the processor to which the software is licensed. Order the quantity of features equal to the MSU rating of the processor.

New Application License Charge

Basic license one-time charge

Entitlement identifier	Description	License option/Pricing metric
S01728T	z/OS V2 Base	Basic MLC, NALC
S01728Z	z/OS V2 XL C/C++	Basic MLC, NALC
S017291	z/OS V2 DFSMS dsshsm	Basic MLC, NALC
S017292	z/OS V2 DFSMS rmm	Basic MLC, NALC
S017293	z/OS V2 DFSMStvs	Basic MLC, NALC
S017294	z/OS V2 DFSORT	Basic MLC, NALC
S01729C	z/OS V2 RMF	Basic MLC, NALC
S01729D	z/OS V2 SDSF	Basic MLC, NALC
S01729F	z/OS V2 Security Server	Basic MLC, NALC
S01780D	z/OS V2 zEDC	Basic MLC, NALC

z Systems entry license charge (zELC)

To order zELC software, specify the program number and z800 model.

Specify the zELC monthly license option.

Entitlement identifier	Description	License option/Pricing metric
S01728S	z/OS V2 Alternate Base	Basic MLC, zELC
S01728T	z/OS V2 Base	Basic MLC, zELC
S01728V	z/OS V2 BDT FTF	Basic MLC, zELC
S01728W	z/OS V2 BDT SNA NJE	Basic MLC, zELC
S01728X	z/OS V2 BookManager Build	Basic MLC, zELC
S01728Z	z/OS V2 XL C/C++	Basic MLC, zELC
S017290	z/OS V2 DFSMS dss	Basic MLC, zELC
S017291	z/OS V2 DFSMS dsshsm	Basic MLC, zELC
S017292	z/OS V2 DFSMS rmm	Basic MLC, zELC
S017293	z/OS V2 DFSMStvs	Basic MLC, zELC
S017294	z/OS V2 DFSORT	Basic MLC, zELC
S017295	z/OS V2 GDDM-PGF	Basic MLC, zELC
S017296	z/OS V2 GDDM-REXX	Basic MLC, zELC
S017297	z/OS V2 HCM	Basic MLC, zELC
S017298	z/OS V2 HLASM Toolkit	Basic MLC, zELC
S017299	z/OS V2 Infoprint Server	Basic MLC, zELC
S01729B	z/OS V2 JES3	Basic MLC, zELC
S01729C	z/OS V2 RMF	Basic MLC, zELC
S01729D	z/OS V2 SDSF	Basic MLC, zELC
S01729F	z/OS V2 Security Server	Basic MLC, zELC
S01780D	z/OS V2 zEDC	Basic MLC, zELC

z Systems New Application License Charge (zNALC)

z/OS (and z/OS priced features) is the only program eligible for zNALC charges. In the IBM enterprise software billing and fulfillment system, IBM uses the term "Basic License" to indicate licenses that are billable. When software is licensed to a stand-alone server, IBM places basic (billable) licenses on that stand-alone server. When software is licensed to multiple machines in a qualified Parallel Sysplex, IBM places basic (billable) licenses on an entity representing the Sysplex and places registration (no-charge) licenses on each licensed machine belonging to the Parallel Sysplex.

z/OS with zNALC charges can aggregate across servers that participate in a fully qualified Parallel Sysplex. For more information on Parallel Sysplex, go to the IBM z Systems™ Software Pricing website.

In the case that there are multiple servers with z/OS with zNALC charges participating in qualified Parallel Sysplex and you request aggregated pricing, then IBM will apply the zNALC basic license structure to the Sysplex and apply zNALC

no-charge registration licenses to each of the individual servers that comprise the Sysplex.

Basic license structure

Entitlement identifier	Description	License option/Pricing metric
S01728S	z/OS V2 Alternate Base	Basic MLC, zNALC
S01728T	z/OS V2 Base	Basic MLC, zNALC
S01728V	z/OS V2 BDT FTF	Basic MLC, zNALC
S01728W	z/OS V2 BDT SNA NJE	Basic MLC, zNALC
S01728X	z/OS V2 BookManager Build	Basic MLC, zNALC
S01728Z	z/OS V2 XL C/C++	Basic MLC, zNALC
S017290	z/OS V2 DFSMS dss	Basic MLC, zNALC
S017291	z/OS V2 DFSMS dsshsm	Basic MLC, zNALC
S017292	z/OS V2 DFSMS rmm	Basic MLC, zNALC
S017293	z/OS V2 DFSMStvs	Basic MLC, zNALC
S017294	z/OS V2 DFSORT	Basic MLC, zNALC
S017295	z/OS V2 GDDM-PGF	Basic MLC, zNALC
S017296	z/OS V2 GDDM-REXX	Basic MLC, zNALC
S017297	z/OS V2 HCM	Basic MLC, zNALC
S017298	z/OS V2 HLASM Toolkit	Basic MLC, zNALC
S017299	z/OS V2 Infoprint Server	Basic MLC, zNALC
S01729B	z/OS V2 JES3	Basic MLC, zNALC
S01729C	z/OS V2 RMF	Basic MLC, zNALC
S01729D	z/OS V2 SDSF	Basic MLC, zNALC
S01729F	z/OS V2 Security Server	Basic MLC, zNALC
S01780D	z/OS V2 zEDC	Basic MLC, zNALC

System z New Application License Charge (zNALC) Basic License

To order a basic license, specify the program number and the quantity of MSUs.

Basic machine-readable material

The following no-charge features are added to z/OS V2.3 and can be ordered effective September 15, 2017. These no-charge media features have pricing/billing features associated with them. It is those associated pricing/billing features where the charges are listed and not the media features listed below. See the notes below for details on past announcements for this information.

z/OS V2.3 Feature description	z/OS V2.3 Orderable supply ID
Base	S018699

Notes:

This product ships its executable code via Customized Offerings (ServerPac and CBPDO). The media type is chosen during the customized offering ordering procedure. See the Customized Offerings section for the media types offered.

Customization options

Expedite shipments will be processed to receive 72-hour delivery from the time IBM Software Delivery and Fulfillment (SDF) receives the order. SDF will then ship the order via overnight air transportation.

Optional machine-readable material

To order, select the feature number for the desired distribution medium:

Optional unpriced features -z/OS V2.3

The following optional features, offered at no additional charge, can be ordered effective September 15, 2017.

z/OS V2.3 Feature description	z/OS V2.3 Orderable supply ID
Communications Server Security Level 3	S0183BF
z/OS Security Level 3	S0183BG

Optional priced features

The following optional no-charge features can be ordered effective September 15, 2017. These optional no-charge media features have pricing/billing features associated with them. It is those associated pricing/billing features where the charges are listed and not the media features listed below.

z/OS V2.3 Feature description	z/OS V2.3 Orderable supply ID
BDT FTF	S01839T
BDT SNA NJE	S01839V
XL C/C++	S01839W
DFSMS dss	S01839Z
DFSMS dss,hsm	S0183B0
DFSMS rmm	S0183B1
DFSMStvs	S0183B2
DFSORT	S0183B3
GDDM-PGF	S0183B4
GDDM-REXX	S0183B5
HCM	S01839N
HLASM Toolkit	S0183B6
Infoprint Server	S0183B7
JES3	S01839P
RMF	S01839R
SDSF	S0183B9
Security Server	S0183BC
zEDC	S0183BH

Optional unpriced language features

The z/OS V2.3 language features will become generally available on the same date the release becomes available.

z/OS V2.3 provides support in the languages listed below. However, not all elements within z/OS V2.3 are translated into each language. See *z/OS Planning for Installation* (GA32-0890) in the z/OS Internet Library for information about the languages in which z/OS elements and features are available.

The following optional features, offered at no additional charge, are added to z/OS V2.3 and can be ordered effective September 15, 2017.

The language features for z/OS V2.3 are:

z/OS V2.3 Feature description	z/OS V2.3 Orderable supply ID
Multilingual Base	S01869C
JPN Base	S01869B
JPN XL C/C++	S01839X
JPN Infoprint Server	S0183B8
JPN RMF	S01839S
JPN Security Server	S0183BD

Unlicensed documentation

A program directory is supplied automatically with the basic machine-readable material.

To access the unlicensed z/OS product documentation, start at the z/OS Internet Library. It contains direct links to the following repositories and content:

- IBM Knowledge Center sections for z/OS V2.3 and other supported releases
- z/OS V2R3 Library, hosted on Resource Link(R), to download individual PDFs
- Adobe™ Indexed PDF Collection (SC27-8430) to easily conduct offline searches on the z/OS product documentation
- Collections of IBM Knowledge Center plug-ins, including the z/OS Base and Features KC4z plug-in collection (SK4T-9263), for customers who host their own instances of IBM Knowledge Center for z/OS (KC4z)

PDF collections are provided in the "zip" format that any modern zip utility can process.

Licensed documentation

Subsequent updates (technical newsletters or revisions between releases) to the publications shipped with the product will be distributed to the user of record for as long as a license for this software remains in effect. A separate publication order or subscription is not needed.

Customized Offerings

Product deliverables are shipped only through CBPDO and ServerPac. These customized offerings are offered for internet delivery from Shopz. Internet delivery reduces software delivery time and allows you to install software without the need to handle tapes. For more details on internet delivery, go to the Help section on the Shopz website.

You choose the delivery method when you order the software. IBM recommends internet delivery. In addition to internet and DVD, the supported tape delivery options include:

- 3590
- 3592

Most products can be ordered in ServerPac the month following their availability in CBPDO. z/OS can be ordered through CBPDO and ServerPac at general availability. Many products will also be orderable in a Product ServerPac without also having to order the z/OS operating system or subsystem.

Shopz and CFSW will determine the eligibility based on product requisite checking. For more details on the product ServerPac, go to the Help section on the Shopz website.

For additional information on the Product ServerPac option, see Software Announcement 212-272, dated July 31, 2012.

Production of software product orders will begin on the planned general availability date.

- CBPDO shipments will begin one week after general availability.
- ServerPac shipments will begin two weeks after general availability.

Terms and conditions

The terms for z/OS Version 2 (5650-ZOS), as previously announced in Software Announcement 213-292, dated July 23, 2013, licensed under the IBM Customer Agreementare unaffected by this announcement.

Statement of good security practices

IT system security involves protecting systems and information through prevention, detection, and response to improper access from within and outside your enterprise. Improper access can result in information being altered, destroyed, or misappropriated or can result in misuse of your systems to attack others. Without a comprehensive approach to security, no IT system or product should be considered completely secure and no single product or security measure can be completely effective in preventing improper access. IBM systems and products are designed to be part of a lawful, comprehensive security approach, which will necessarily involve additional operational procedures, and may require other systems, products, or services to be most effective.

Important: IBM does not warrant that any systems, products, or services are immune from, or will make your enterprise immune from, the malicious or illegal conduct of any party.

Prices

For additional information and current prices, contact your local IBM representative.

System z entry license charge (zELC)

Entitlement identifier	Description	License option/Pricing metric
S01728S	z/OS V2 Alternate Base	Basic MLC, zELC
S01728T	z/OS V2 Base	Basic MLC, zELC
S01728V	z/OS V2 BDT FTF	Basic MLC, zELC
S01728W	z/OS V2 BDT SNA NJE	Basic MLC, zELC
S01728X	z/OS V2 BookManager Build	Basic MLC, zELC
S01728Z	z/OS V2 XL C/C++	Basic MLC, zELC
S017290	z/OS V2 DFSMS dss	Basic MLC, zELC
S017291	z/OS V2 DFSMS dsshsm	Basic MLC, zELC
S017292	z/OS V2 DFSMS rmm	Basic MLC, zELC
S017293	z/OS V2 DFSMStvs	Basic MLC, zELC
S017294	z/OS V2 DFSORT	Basic MLC, zELC
S017295	z/OS V2 GDDM-PGF	Basic MLC, zELC
S017296	z/OS V2 GDDM-REXX	Basic MLC, zELC
S017297	z/OS V2 HCM	Basic MLC, zELC
S017298	z/OS V2 HLASM Toolkit	Basic MLC, zELC
S017299	z/OS V2 Infoprint Server	Basic MLC, zELC
S01729B	z/OS V2 JES3	Basic MLC, zELC
S01729C	z/OS V2 RMF	Basic MLC, zELC
S01729D	z/OS V2 SDSF	Basic MLC, zELC
S01729F	z/OS V2 Security Server	Basic MLC, zELC
S01780D	z/OS V2 zEDC	Basic MLC, zELC

Parallel Sysplex license charge (PSLC) basic license

Entitlement identifier	Description	License option/Pricing metric
S01728S	z/OS V2 Alternate Base	Basic MLC, PSLC
S01728T	z/OS V2 Base	Basic MLC, PSLC
S01728V	z/OS V2 BDT FTF	Basic MLC, PSLC
S01728W	z/OS V2 BDT SNA NJE	Basic MLC, PSLC
S01728X	z/OS V2 BookManager Build	Basic MLC, PSLC

Entitlement identifier	Description	License option/Pricing metric
S01728Z	z/OS V2 XL C/C++	Basic MLC, PSLC
S017290	z/OS V2 DFSMS dss	Basic MLC, PSLC
S017291	z/OS V2 DFSMS dsshsm	Basic MLC, PSLC
S017292	z/OS V2 DFSMS rmm	Basic MLC, PSLC
S017293	z/OS V2 DFSMStvs	Basic MLC, PSLC
S017294	z/OS V2 DFSORT	Basic MLC, PSLC
S017295	z/OS V2 GDDM-PGF	Basic MLC, PSLC
S017296	z/OS V2 GDDM-REXX	Basic MLC, PSLC
S017297	z/OS V2 HCM	Basic MLC, PSLC
S017298	z/OS V2 HLASM Toolkit	Basic MLC, PSLC
S017299	z/OS V2 Infoprint Server	Basic MLC, PSLC
S01729B	z/OS V2 JES3	Basic MLC, PSLC
S01729C	z/OS V2 RMF	Basic MLC, PSLC
S01729D	z/OS V2 SDSF	Basic MLC, PSLC
S01729F	z/OS V2 Security Server	Basic MLC, PSLC
S01780D	z/OS V2 zEDC	Basic MLC, PSLC

Advanced Workload License Charges (AWLC) basic license

Entitlement identifier	Description	License option/Pricing metric
S01728S	z/OS V2 Alternate Base	Basic MLC, AWLC
S01728T	z/OS V2 Base	Basic MLC, AWLC
S01728V	z/OS V2 BDT FTF	Basic MLC, AWLC
S01728W	z/OS V2 BDT SNA NJE	Basic MLC, AWLC
S01728X	z/OS V2 BookManager Build	Basic MLC, AWLC
S01728Z	z/OS V2 XL C/C++	Basic MLC, AWLC
S017290	z/OS V2 DFSMS dss	Basic MLC, AWLC
S017291	z/OS V2 DFSMS dsshsm	Basic MLC, AWLC
S017292	z/OS V2 DFSMS rmm	Basic MLC, AWLC
S017293	z/OS V2 DFSMStvs	Basic MLC, AWLC
S017294	z/OS V2 DFSORT	Basic MLC, AWLC
S017295	z/OS V2 GDDM-PGF	Basic MLC, AWLC
S017296	z/OS V2 GDDM-REXX	Basic MLC, AWLC
S017297	z/OS V2 HCM	Basic MLC, AWLC
S017298	z/OS V2 HLASM Toolkit	Basic MLC, AWLC
S017299	z/OS V2 Infoprint Server	Basic MLC, AWLC
S01729B	z/OS V2 JES3	Basic MLC, AWLC
S01729C	z/OS V2 RMF	Basic MLC, AWLC
S01729D	z/OS V2 SDSF	Basic MLC, AWLC
S01729F	z/OS V2 Security Server	Basic MLC, AWLC
S01780D	z/OS V2 zEDC	Basic MLC, AWLC

Advanced Entry Workload License Charges (AEWLC) basic license

Entitlement identifier	Description	License option/Pricing metric
S01728S	z/OS V2 Alternate Base	Basic MLC, AEWLC
S01728T	z/OS V2 Base	Basic MLC, AEWLC
S01728V	z/OS V2 BDT FTF	Basic MLC, AEWLC
S01728W	z/OS V2 BDT SNA NJE	Basic MLC, AEWLC
S01728X	z/OS V2 BookManager Build	Basic MLC, AEWLC
S01728Z	z/OS V2 XL C/C++	Basic MLC, AEWLC
S017290	z/OS V2 DFSMS dss	Basic MLC, AEWLC
S017291	z/OS V2 DFSMS dsshsm	Basic MLC, AEWLC

Entitlement identifier	Description	License option/Pricing metric
S017292	z/OS V2 DFSMS rmm	Basic MLC, AEWLC
S017293	z/OS V2 DFSMStvs	Basic MLC, AEWLC
S017294	z/OS V2 DFSORT	Basic MLC, AEWLC
S017295	z/OS V2 GDDM-PGF	Basic MLC, AEWLC
S017296	z/OS V2 GDDM-REXX	Basic MLC, AEWLC
S017297	z/OS V2 HCM	Basic MLC, AEWLC
S017298	z/OS V2 HLASM Toolkit	Basic MLC, AEWLC
S017299	z/OS V2 Infoprint Server	Basic MLC, AEWLC
S01729B	z/OS V2 JES3	Basic MLC, AEWLC
S01729C	z/OS V2 RMF	Basic MLC, AEWLC
S01729D	z/OS V2 SDSF	Basic MLC, AEWLC
S01729F	z/OS V2 Security Server	Basic MLC, AEWLC
S01780D	z/OS V2 zEDC	Basic MLC, AEWLC

Sub-capacity charges for AWLC, AEWLC, CMLC, zNALC, VWLC, EWLC, and MWLC products

Sub-capacity charges for eligible products are based on product LPAR utilization capacity. Product LPAR utilization capacity for a sub-capacity product is the highest number of MSUs utilized by the combined LPARs in which the product runs concurrently during a reporting period. The number of MSUs is based on the highest observed rolling 4-hour average utilization used by the combination of the relevant LPARs during the reporting period.

Sub-capacity charges terms and conditions

Z software charges at less than full machine capacity for eligible sub-capacity products apply when z/OS, z/TPF, or z/VSE(R) is running in z/Architecture(R) (64-bit) mode on a Z server, no other z/OS- based, TPF-based, or VSE-based operating system respectively is licensed to that server, and the required information is provided by the customer in accordance with the applicable terms.

Sub-capacity charges for a sub-capacity product are based on the utilization of the LPARs where/when the product executes. To obtain charges at less than full machine capacity for sub-capacity products, the customer is required to:

- Sign and abide by the terms of one of the following:
  - Attachment for IBM System z Advanced Workload License Charges (Z125-8538)
  - Attachment for IBM System z Advanced Entry Workload License Charges (Z125-8755)
  - Attachment for IBM Country Multiplex Pricing (Z126-6965)
  - Attachment for zNALC License Charges on IBM System z (Z125-7454)
  - Attachment for IBM System z Workload License Charges (Z125-6516
  - Attachment for EWLC, TWLC, zELC, and z/OS.e License Charges (Z125-6587)
  - Attachment for IBM System z Midrange Workload License Charges (Z125-7452)
- Obtain the latest version of the Sub-Capacity Reporting Tool.
- Install any sub-capacity product and IBM z Systems Licensed Internal Code (LIC) service required for sub-capacity charging. Required service will be listed on the IBM z Systems Sub-Capacity website.
- Collect SMF or SCRT89 data as required by the Sub-Capacity Reporting Tool. Retain the collected data for a period of not less than six months.
- Use the IBM provided Sub-Capacity Reporting Tool to process the collected SMF or SCRT89 data. The Sub-Capacity Report produced by the tool is used to determine required license capacity for the sub-capacity products. Required license capacity is determined based on the largest MSU value of a sub-capacity product running concurrently in all LPARs during the reporting period. IBM reserves the right to request the system data that supports these product-

defined capacity values for a period of up to six months after the data was collected.

- Provide an initial Sub-Capacity Report to begin to receive the benefits of less than full machine capacity charges. Sub-capacity charging will follow submission of a Sub-Capacity Report. There will be no retroactive application of sub-capacity charges.
- Submit Sub-Capacity Reports monthly between the 2nd and 9th days of the month after the reporting period.
- Submit Sub-Capacity Reports for all sub-capacity products with complete data for the entire reporting period via the method specified on the IBM z Systems Sub-Capacity website.

  Sub-Capacity Reports that reflect a changed product defined capacity will be considered to be orders placed by the customer without further action on the customer's part, and IBM is authorized to make any resulting billing increase or decrease, including the ordering of any necessary new licenses. To discontinue licenses, move licenses between machines, report a hardware model upgrade, or enable or disable product features, the customer must contact IBM or their IBM Business Partner.

- Configure the machine to send weekly Transmit System Availability Data (TSAD) to IBM via the IBM z Systems Remote Support Facility (RSF). If the machine cannot connect via the RSF, provide this TSAD through an alternate means documented in the *SCRT Users Guide* (SG24-6522) on the IBM z Systems Sub-Capacity website.

Entitlement identifier	Description	License option/Pricing metric
S01728S	z/OS V2 Alternate Base	Basic MLC, CMLC
S01728T	z/OS V2 Base	Basic MLC, CMLC
S01728V	z/OS V2 BDT FTF	Basic MLC, CMLC
S01728W	z/OS V2 BDT SNA NJE	Basic MLC, CMLC
S01728X	z/OS V2 BookManager Build	Basic MLC, CMLC
S01728Z	z/OS V2 XL C/C++	Basic MLC, CMLC
S017290	z/OS V2 DFSMS dss	Basic MLC, CMLC
S017291	z/OS V2 DFSMS dsshsm	Basic MLC, CMLC
S017292	z/OS V2 DFSMS rmm	Basic MLC, CMLC
S017293	z/OS V2 DFSMStvs	Basic MLC, CMLC
S017294	z/OS V2 DFSORT	Basic MLC, CMLC
S017295	z/OS V2 GDDM-PGF	Basic MLC, CMLC
S017296	z/OS V2 GDDM-REXX	Basic MLC, CMLC
S017297	z/OS V2 HCM	Basic MLC, CMLC
S017298	z/OS V2 HLASM Toolkit	Basic MLC, CMLC
S017299	z/OS V2 Infoprint Server	Basic MLC, CMLC
S01729B	z/OS V2 JES3	Basic MLC, CMLC
S01729C	z/OS V2 RMF	Basic MLC, CMLC
S01729D	z/OS V2 SDSF	Basic MLC, CMLC
S01729F	z/OS V2 Security Server	Basic MLC, CMLC
S01780D	z/OS V2 zEDC	Basic MLC, CMLC

Entitlement identifier	Description	License option/Pricing metric
S01728S	z/OS V2 Alternate Base	Basic MLC, MzNALC
S01728T	z/OS V2 Base	Basic MLC, MzNALC
S01728V	z/OS V2 BDT FTF	Basic MLC, MzNALC
S01728W	z/OS V2 BDT SNA NJE	Basic MLC, MzNALC
S01728X	z/OS V2 BookManager Build	Basic MLC, MzNALC
S01728Z	z/OS V2 XL C/C++	Basic MLC, MzNALC
S017290	z/OS V2 DFSMS dss	Basic MLC, MzNALC

Entitlement identifier	Description	License option/Pricing metric
S017291	z/OS V2 DFSMS dsshsm	Basic MLC, MzNALC
S017292	z/OS V2 DFSMS rmm	Basic MLC, MzNALC
S017293	z/OS V2 DFSMStvs	Basic MLC, MzNALC
S017294	z/OS V2 DFSORT	Basic MLC, MzNALC
S017295	z/OS V2 GDDM-PGF	Basic MLC, MzNALC
S017296	z/OS V2 GDDM-REXX	Basic MLC, MzNALC
S017297	z/OS V2 HCM	Basic MLC, MzNALC
S017298	z/OS V2 HLASM Toolkit	Basic MLC, MzNALC
S017299	z/OS V2 Infoprint Server	Basic MLC, MzNALC
S01729B	z/OS V2 JES3	Basic MLC, MzNALC
S01729C	z/OS V2 RMF	Basic MLC, MzNALC
S01729D	z/OS V2 SDSF	Basic MLC, MzNALC
S01729F	z/OS V2 Security Server	Basic MLC, MzNALC
S01780D	z/OS V2 zEDC	Basic MLC, MzNALC

Entitlement identifier	Description	License option/Pricing metric
S01728S	z/OS V2 Alternate Base	Basic MLC, VWLC
S01728T	z/OS V2 Base	Basic MLC, VWLC
S01728V	z/OS V2 BDT FTF	Basic MLC, VWLC
S01728W	z/OS V2 BDT SNA NJE	Basic MLC, VWLC
S01728X	z/OS V2 BookManager Build	Basic MLC, VWLC
S01728Z	z/OS V2 XL C/C++	Basic MLC, VWLC
S017290	z/OS V2 DFSMS dss	Basic MLC, VWLC
S017291	z/OS V2 DFSMS dsshsm	Basic MLC, VWLC
S017292	z/OS V2 DFSMS rmm	Basic MLC, VWLC
S017293	z/OS V2 DFSMStvs	Basic MLC, VWLC
S017294	z/OS V2 DFSORT	Basic MLC, VWLC
S017295	z/OS V2 GDDM-PGF	Basic MLC, VWLC
S017296	z/OS V2 GDDM-REXX	Basic MLC, VWLC
S017297	z/OS V2 HCM	Basic MLC, VWLC
S017298	z/OS V2 HLASM Toolkit	Basic MLC, VWLC
S017299	z/OS V2 Infoprint Server	Basic MLC, VWLC
S01729B	z/OS V2 JES3	Basic MLC, VWLC
S01729C	z/OS V2 RMF	Basic MLC, VWLC
S01729D	z/OS V2 SDSF	Basic MLC, VWLC
S01729F	z/OS V2 Security Server	Basic MLC, VWLC
S01780D	z/OS V2 zEDC	Basic MLC, VWLC

Entry Workload License Charge (EWLC):

Entry Workload License Charge (EWLC) Basic License

Entitlement identifier	Description	License option/Pricing metric
S01728S	z/OS V2 Alternate Base	Basic MLC, EWLC
S01728T	z/OS V2 Base	Basic MLC, EWLC
S01728V	z/OS V2 BDT FTF	Basic MLC, EWLC
S01728W	z/OS V2 BDT SNA NJE	Basic MLC, EWLC
S01728X	z/OS V2 BookManager Build	Basic MLC, EWLC
S01728Z	z/OS V2 XL C/C++	Basic MLC, EWLC
S017290	z/OS V2 DFSMS dss	Basic MLC, EWLC
S017291	z/OS V2 DFSMS dsshsm	Basic MLC, EWLC
S017292	z/OS V2 DFSMS rmm	Basic MLC, EWLC

Entitlement identifier	Description	License option/Pricing metric
S017293	z/OS V2 DFSMStvs	Basic MLC, EWLC
S017294	z/OS V2 DFSORT	Basic MLC, EWLC
S017295	z/OS V2 GDDM-PGF	Basic MLC, EWLC
S017296	z/OS V2 GDDM-REXX	Basic MLC, EWLC
S017297	z/OS V2 HCM	Basic MLC, EWLC
S017298	z/OS V2 HLASM Toolkit	Basic MLC, EWLC
S017299	z/OS V2 Infoprint Server	Basic MLC, EWLC
S01729B	z/OS V2 JES3	Basic MLC, EWLC
S01729C	z/OS V2 RMF	Basic MLC, EWLC
S01729D	z/OS V2 SDSF	Basic MLC, EWLC
S01729F	z/OS V2 Security Server	Basic MLC, EWLC
S01780D	z/OS V2 zEDC	Basic MLC, EWLC

New Application License Charge (NALC) charges

Entitlement identifier	Description	License option/ Pricing metric
S01728T	z/OS V2 Base	Basic MLC, NALC
S01728Z	z/OS V2 XL C/C++	Basic MLC, NALC
S017291	z/OS V2 DFSMS dsshsm	Basic MLC, NALC
S017292	z/OS V2 DFSMS rmm	Basic MLC, NALC
S017293	z/OS V2 DFSMStvs	Basic MLC, NALC
S017294	z/OS V2 DFSORT	Basic MLC, NALC
S01729C	z/OS V2 RMF	Basic MLC, NALC
S01729D	z/OS V2 SDSF	Basic MLC, NALC
S01729F	z/OS V2 Security Server	Basic MLC, NALC
S01780D	z/OS V2 zEDC	Basic MLC, NALC

System z New Application License Charge (zNALC) Basic License

Entitlement identifier	Description	License option/Pricing metric
S01728S	z/OS V2 Alternate Base	Basic MLC, zNALC
S01728T	z/OS V2 Base	Basic MLC, zNALC
S01728V	z/OS V2 BDT FTF	Basic MLC, zNALC
S01728W	z/OS V2 BDT SNA NJE	Basic MLC, zNALC
S01728X	z/OS V2 BookManager Build	Basic MLC, zNALC
S01728Z	z/OS V2 XL C/C++	Basic MLC, zNALC
S017290	z/OS V2 DFSMS dss	Basic MLC, zNALC
S017291	z/OS V2 DFSMS dsshsm	Basic MLC, zNALC
S017292	z/OS V2 DFSMS rmm	Basic MLC, zNALC
S017293	z/OS V2 DFSMStvs	Basic MLC, zNALC
S017294	z/OS V2 DFSORT	Basic MLC, zNALC
S017295	z/OS V2 GDDM-PGF	Basic MLC, zNALC
S017296	z/OS V2 GDDM-REXX	Basic MLC, zNALC
S017297	z/OS V2 HCM	Basic MLC, zNALC
S017298	z/OS V2 HLASM Toolkit	Basic MLC, zNALC
S017299	z/OS V2 Infoprint Server	Basic MLC, zNALC
S01729B	z/OS V2 JES3	Basic MLC, zNALC
S01729C	z/OS V2 RMF	Basic MLC, zNALC
S01729D	z/OS V2 SDSF	Basic MLC, zNALC
S01729F	z/OS V2 Security Server	Basic MLC, zNALC
S01780D	z/OS V2 zEDC	Basic MLC, zNALC

For additional product information, see Software Announcement 215-267, dated July 28, 2015.

Variable charges

The applicable processor based one-time charge will be based on the group of the designated machine on which the program is licensed for use. If the program is designated to a processor in a group for which no charge is listed, the charge of the next higher group listed applies. For movement to a machine in a higher group, an upgrade charge equal to the difference in the then-current charges between the two groups will apply. For movement to a machine in a lower group, there will be no adjustment or refund of charges paid.

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Corrections

(Corrected on September 27, 2017)

In the Description section, zFS statements were revised.