For: CMG Canada

By: Jim Elliott
GlassHouse Systems

Presentation Date:
Wednesday, April 26, 2017
Agenda

- IBM z13s/LinuxONE Rockhopper
- IBM zNext MR Implications – Coupling Link Changes
- IBM Dynamic Partition Manager
- Linux and Blockchain on IBM z Systems
- Managing IBM z/OS Software Charges
- IBM z/OS 2.3 Preview
IBM z13s and LinuxONE Rockhopper
The IBM z13s/LinuxONE Rockhopper

**Machine Type: 2965 Models: N10/L10 and N20/L20**

<table>
<thead>
<tr>
<th>Performance and scale helping improve client experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Up to 20 configurable cores</td>
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<tr>
<td>▪ Larger cache for improved data serving</td>
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<tr>
<td>▪ New SIMD vector facility for faster mathematical computation</td>
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<td>▪ Up to 4 TB memory to reduce latency (8X more than zBC12)</td>
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<tr>
<td>▪ Simultaneous multithreading expands zIIP and IFL capacity</td>
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<tr>
<td>▪ Industry-leading resilient and intelligent I/O</td>
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<tr>
<td>▪ Improved network-in-a-box communications</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Focused on enterprise Linux</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Continuous data availability for z/OS and Linux guests hosted by z/VM with new GDPS Appliance</td>
</tr>
<tr>
<td>▪ IBM Dynamic Partition Manager simplifies management</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Better Economics, Flexibility and Efficiency</th>
</tr>
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<tbody>
<tr>
<td>▪ 40% more total z/OS capacity</td>
</tr>
<tr>
<td>▪ 110% more total Linux capacity</td>
</tr>
<tr>
<td>▪ 1.3x more logical partitions to host more cloud tenants (40 vs. 30)</td>
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<tr>
<td>▪ 4x data access with zEDC</td>
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<tr>
<td>▪ Rack mounted HMC and TKE</td>
</tr>
<tr>
<td>▪ Lowering costs and raising RAS with ASHRAE A3 envelope</td>
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</table>

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<tr>
<th>Fortified cyber security for less risk</th>
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<tbody>
<tr>
<td>▪ Improved recovery time using zHPF</td>
</tr>
<tr>
<td>▪ Insure protection and integrity with next generation cryptography</td>
</tr>
<tr>
<td>▪ New PCIe based short range coupling links</td>
</tr>
<tr>
<td>▪ Secure deployment of software virtual appliances</td>
</tr>
</tbody>
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**Model** | **Customer PUs** | **Max Mem** |
---|---|---|
N10/L10 | 10 | 984 GB |
N20/L20 1 CPC Drawer | 20 | 2008 GB |
N20/L20 2 CPC Drawers | 20 | 4056 GB |

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IBM z13s Models N10/N20
IBM LinuxONE Rockhopper Models L10/L20

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z13s Model N20 (One CPC Drawer) – Under the Covers

- Internal Batteries (optional)
- Power Supplies
- 1 x CPC Drawer + slot for 2nd CPC Drawer
- Memory & Fanouts
- Support Elements
- Ethernet cables for internal System LAN connecting Flexible Service Processor (FSP) cage controller cards (not shown)
- SCH (x2)
- Monitors + keyboards for SEs
- PCIe I/O Drawers
- I/O Drawer

Note: A 2 CPC drawer N20 can only support a maximum of 2 PCIe I/O Drawers OR one PCIe I/O Drawer and one I/O Drawer.
2965 Processor Unit (PU) Chip Details

- **14S0 22nm SOI Technology**
  - 17 layers of metal
  - 3.99 Billion Transistors
  - 13.7 miles of copper wire

- **Chip Area**
  - 678.8 mm² / 28.4 x 23.9 mm
  - 17,773 power pins
  - 1,603 signal I/Os

- **6 or 7 active cores (PUs) per chip on 2965 (designed with 8 cores total)**
  - 4.3 GHz (vs. 4.2GHz for zBC12)
  - L1 cache / core, 96 KB I-cache / 128 KB D-cache
  - L2 cache / core, 2M i+2M d Byte eDRAM split private L2 cache

- **Single Instruction/Multiple Data (SIMD)**
- **Single thread or 2-way simultaneous multithreading (SMT) operation**

- **Improved instruction execution bandwidth:**
  - Greatly improved branch prediction and instruction fetch to support SMT
  - Instruction decode, dispatch, complete increased to 6 instructions per cycle
  - Issue up to 10 instructions per cycle
  - Integer and floating point execution units

- **On chip 64 MB eDRAM L3 Cache**
  - Shared by all cores

- **I/O buses**
  - One InfiniBand I/O bus
  - Two PCIe I/O buses

- **Memory Controller (MCU)**
  - Interface to controller on memory DIMMs
  - Supports RAIM design
Model supports a single Node (Node 0)

Each Node Supports:

- One System Control (SC) chip (480 MB L4 cache)
- Two Processing Units (PU) chips running at 4.3 GHz
  - Eight-core per PU chip design
  - Six or seven active cores per PU chip
- One memory controller per PU chip (two per node)
- Five DDR3 DIMM slots per memory controller: 10 total per node (up to 1024 GB per node)
- Two Flexible Service Processors
- Four PCIe fanout slots
- Two slots for IFB (HCA3-O) fanouts
Performance delivered through multiple dimensions

- **Hardware**
  - 40% more total z/OS capacity
  - 110% more total Linux capacity
  - 2.3x performance boost for cryptographic coprocessors
  - Up to 1.5x improvement for generic apps with Java8 using SIMD and SMT
  - 1.5x-1.8x more bandwidth per I/O domain
  - 2x increase in channel speed
  - 8x increase in memory
  - 2x increase in cache

- **Software**
  - Faster decision making with data-in-memory
  - Less exposure to regulatory penalties
  - Hundreds of production capable virtual machines
  - Faster data sharing between systems
  - More scale for mobile transactions
  - Faster fraud detection
  - Lower cloud cost

1 Comparison to zEC12. Official performance data will be available upon announce and can be obtained online at LSPR (Large Systems Performance Reference) website at: https://ibm.com/servers/resource-links/lsp/index. Actual performance results may vary by customer based on individual workload, configuration and software levels.
## IBM z Systems Single Frame Comparison

<table>
<thead>
<tr>
<th></th>
<th>zBC12 (2828) H06</th>
<th>zBC12 (2828) H13</th>
<th>z13s (2965) N10/L10</th>
<th>z13s (2965) N20/L20&lt;sup&gt;(1)&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Uniprocessor Performance</strong></td>
<td>1064 MIPS</td>
<td>1430 MIPS (+34%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>4.2 GHz</td>
<td>4.3 GHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>z/OS Capacity</strong></td>
<td>50 to 4958 MIPS</td>
<td>80 to 7123 MIPS</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total System Memory</strong></td>
<td>240 GB</td>
<td>496 GB</td>
<td>1TB</td>
<td>4TB</td>
</tr>
<tr>
<td><strong>Configurable Specialty Engines</strong></td>
<td>6</td>
<td>13</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td><strong>Configurable CPs</strong></td>
<td>0 – 6</td>
<td>0 to 6</td>
<td></td>
<td></td>
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<tr>
<td><strong>LPARS/LCSS</strong></td>
<td>30/2</td>
<td>40/3</td>
<td></td>
<td></td>
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<tr>
<td><strong>HiperSockets</strong></td>
<td>32</td>
<td>32</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PCIe I/O drawer, I/O drawer, Max</strong></td>
<td>2, 1, 3</td>
<td>2, 1, 3</td>
<td>1, 1, 2&lt;sup&gt;(2)&lt;/sup&gt;</td>
<td>2, 1, 3&lt;sup&gt;(2)&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>I/O slots per I/O drawers/ PCIe I/O drawers</strong></td>
<td>8/32</td>
<td>8/32</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>FICON® Channels</strong></td>
<td>128</td>
<td>64&lt;sup&gt;(3)&lt;/sup&gt;</td>
<td>128&lt;sup&gt;(3)&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td><strong>OSA Ports</strong></td>
<td>96</td>
<td>64&lt;sup&gt;(3)&lt;/sup&gt;</td>
<td>96&lt;sup&gt;(3)&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td><strong>ESCON® Channels</strong></td>
<td>0&lt;sup&gt;(4)&lt;/sup&gt;</td>
<td>0&lt;sup&gt;(4)&lt;/sup&gt;</td>
<td></td>
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<tr>
<td><strong>IFB host bus Bandwidth, PCIe Bandwidth</strong></td>
<td>6.0 GB/sec (IFB), 8.0 GB/sec (PCIe Gen2)</td>
<td>6.0GB/sec(IFB), 16.0 GB/sec (PCIe Gen3)</td>
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<td></td>
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<tr>
<td><strong>ISC-3, PSIFB, PCIe</strong></td>
<td>32, 8 - 16, 0</td>
<td>32, 16 - 32, 0</td>
<td>0&lt;sup&gt;(5)&lt;/sup&gt;, 4-8&lt;sup&gt;(6)&lt;/sup&gt;, 8</td>
<td>0&lt;sup&gt;(5)&lt;/sup&gt;, 16-32&lt;sup&gt;(7)&lt;/sup&gt;, 16</td>
</tr>
<tr>
<td><strong>zIIP/zAAP Maximum Qty</strong></td>
<td>Up to 4 / 3</td>
<td>Up to 8 / 6</td>
<td>Up to 6&lt;sup&gt;(8)&lt;/sup&gt; / 0</td>
<td>Up to 12&lt;sup&gt;(8)&lt;/sup&gt; / 0</td>
</tr>
<tr>
<td><strong>ICF Maximum Qty</strong></td>
<td>6</td>
<td>13</td>
<td>10</td>
<td>20</td>
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<tr>
<td><strong>Capacity Settings</strong></td>
<td>156</td>
<td>156</td>
<td>156</td>
<td>156</td>
</tr>
<tr>
<td><strong>Upgradeable</strong></td>
<td>H06 to H13, H13 to zEC12 H20 (Radiator-based air cooled only) or to z13s</td>
<td></td>
<td>N10 to N20, N20 to z13 N30 (Radiator-based air cooled only)</td>
<td></td>
</tr>
<tr>
<td>Model</td>
<td>Announced Date</td>
<td>Clock Speed</td>
<td>Configurable Cores</td>
<td>Processor Types</td>
</tr>
<tr>
<td>------------------------</td>
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</tr>
<tr>
<td><strong>z9 Enterprise Class</strong></td>
<td>7/2005</td>
<td>1.7 GHz</td>
<td>Up to 54 cores</td>
<td>CP, IFL, ICF, zAAP, zIIP</td>
</tr>
<tr>
<td><strong>z10 Enterprise Class</strong></td>
<td>2/2008</td>
<td>4.4 GHz</td>
<td>Up to 64 cores</td>
<td>CP, IFL, ICF, zAAP, zIIP</td>
</tr>
<tr>
<td><strong>zEnterprise 196</strong></td>
<td>7/2010</td>
<td>5.2 GHz</td>
<td>Up to 80 cores</td>
<td>CP, IFL, ICF, zAAP, zIIP</td>
</tr>
<tr>
<td><strong>zEnterprise EC12</strong></td>
<td>8/2012</td>
<td>5.5 GHz</td>
<td>Up to 101 cores</td>
<td>CP, IFL, ICF, zAAP, zIIP</td>
</tr>
<tr>
<td><strong>IBM z13</strong></td>
<td>1/2015</td>
<td>5.0 GHz</td>
<td>Up to 141 cores</td>
<td>CP, IFL, ICF, zIIP</td>
</tr>
<tr>
<td><strong>z9 Business Class</strong></td>
<td>4/2006</td>
<td>1.4 GHz</td>
<td>Up to 7 cores</td>
<td>CP, IFL, ICF, zAAP, zIIP</td>
</tr>
<tr>
<td><strong>z10 Business Class</strong></td>
<td>10/2008</td>
<td>3.5 GHz</td>
<td>Up to 10 cores</td>
<td>CP, IFL, ICF, zAAP, zIIP</td>
</tr>
<tr>
<td><strong>zEnterprise 114</strong></td>
<td>7/2011</td>
<td>3.8 GHz</td>
<td>Up to 10 cores</td>
<td>CP, IFL, ICF, zAAP, zIIP</td>
</tr>
<tr>
<td><strong>zEnterprise BC12</strong></td>
<td>7/2013</td>
<td>4.2 GHz</td>
<td>Up to 13 cores</td>
<td>CP, IFL, ICF, zAAP, zIIP</td>
</tr>
<tr>
<td><strong>IBM z13s</strong></td>
<td>2/2016</td>
<td>4.3 GHz</td>
<td>Up to 20 cores</td>
<td>CP, IFL, ICF, zIIP</td>
</tr>
</tbody>
</table>
### z13s Capacity Matrix

- **Improvement over zBC12**
  - A01 Uniprocessor: 80 MIPS (+ 60%)
  - Z01 Uniprocessor: 1,430 MIPS (+ 34%)
  - Z06 provides largest z/OS capacity: 7,123 MIPS (+ 44%)

- **Granularity levels similar to zBC12 to facilitate upgrades and incremental growth**

- **26 capacity levels x 6 CPs = 156 settings**
  - Nomenclature: XYY
  - X = Capacity level (A-Z)
  - YY = Number of processors
  - A00 = ICF or IFL only (zero CPs)

- **Any to any capacity upgrade/downgrade capability within the Model**
- **CBU capability from smallest to largest capacities within the Model**
- **On/Off CoD within the Model**
- **IFLs, ICFs, and zIIPs are always “Znn” capacity**
- **Available MIPS are always less than the theoretical MIPS as a result of the desired configuration**

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### Table: Specialties and PCI

<table>
<thead>
<tr>
<th>Specialty Engine</th>
<th>Specialty Engine</th>
<th>Specialty Engine</th>
<th>Specialty Engine</th>
<th>Specialty Engine</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCI: Processor Capacity Index</td>
<td>1-way</td>
<td>2-way</td>
<td>3-way</td>
<td>4-way</td>
</tr>
</tbody>
</table>

- **Additional PUs available on the N10/N20**
- **Additional PUs available on the N20**

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z Systems Update for CMG Canada  

2017-04-26  
Page 12
Balanced System Design

Notes:
1. Capacity shown is for CPs only
2. z9 BC, z10 BC, z114, zBC12, and z13s can have additional PUs which can be used as Speciality Engines
What Is New in the 2965?

- The 2965 has ultra-high frequency, large high-speed buffers (caches) and memory, superscalar processor design, out-of-order core execution, simultaneous multithreading (SMT), single-instruction multiple-data (SIMD) execution, and flexible configuration options – it is the next implementation of z Systems to address the ever-changing IT environment.
- The microprocessor of 2965 has the same design as 2964, the difference is the frequency – 4.3 GHz vs. 5 GHz for 2964.
- The drawer packaging is also derived from 2964, where the 2965 PU chips are air cooled (vs. water cooled for 2964) as the lower frequency generates less heat.
- 2965 has several microprocessor improvements upon zBC12:
  - Higher instruction execution parallelism (improved OOO instruction handling)
  - Two vector execution units (SIMD)
  - Simultaneous multithreaded (SMT) architecture that supports concurrent execution of two threads
  - Eight-core processor chip (6 or 7 cores per chip will be used with 2965)
  - A robust cache hierarchy

Benefits:
- Performance gains in legacy online transaction processing and business analytics workloads.
Simultaneous Multithreading (SMT)

- Prior z Systems generations support a single instruction stream
  - z Systems workloads tend to receive a nontrivial number of cache misses
  - CPU generally unproductive while resolving cache miss
- z13/z13s SMT makes PU Core productive during cache misses and fills other pipeline gaps
  - z13/z13s supports two way SMT (two instruction streams [threads]) per core
    - Each thread has its own unique state information (Registers, PSW, etc.)
    - Cannot necessarily execute instructions instantly and must compete and win the use of desired core resources shared between threads
    - z13/z13s insures that one thread can’t lock out the other
  - Current z13/z13s implementation allows following engine types to run in SMT mode
    - zIIPs under z/OS, IFLs under z/VM or Linux on z Systems
  - READY TO RUN Threads share core
  - Threads NOT READY TO RUN still unproductive while resolving cache miss
  - Core resources are productive when either READY TO RUN thread is executing
Single Instruction Multiple Data (SIMD)

- **Background**
  - The amount of data is increasing exponentially, IT shops need to respond to the diversity and volume of data
  - Enterprises use traditional integer, floating point, string, and XML character-based data
  - It’s becoming more important for customers to do computations, analytics closer to the data

- **Customer perception of Analytics and z Systems**
  - z Systems handle OLTP and Batch jobs types of workload
  - Mathematical and data intensive operations can lead to unaffordable MIPS usage

- **Reality of Analytics and z Systems**
  - For the past 2-3 generations, z Systems processor has changed its capabilities in compute-intensive processing (analytics)
  - SIMD provides next phase of enhancements for analytics and compute-intensive competitiveness on z Systems
SIMD Vector Processing Support on z Systems

- **Operating Systems / Hypervisors and Software support for SIMD:**
  - z/OS V2.2, or z/OS: 2.1 + PTFs
  - Linux: Supported in the latest updates from Red Hat RHEL, SUSE Labs SLES, and Canonical Ubuntu
  - z/VM 6.4, or z/VM V6.3 + PTFs
  - Compiler exploitation
    - IBM Java 8
    - z/OS XL C/C++ V2R1M1, V2.2 (added AUTOSIMD option)
    - XL C/C++ for Linux on z Systems, V1.1
    - Enterprise COBOL for z/OS v5.2
    - Enterprise PL/I for z/OS v4.5

<table>
<thead>
<tr>
<th>Workloads</th>
<th>Java 8</th>
<th>C/C++ Compiler built-ins for SIMD operations</th>
<th>MASS &amp; ATLAS Math Libraries</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIMD Registers and Instruction Set</td>
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</table>

MASS - Mathematical Acceleration Sub-System
ATLAS - Automatically Tuned Linear Algebra Software
Model N10/L10 Drawer Structure and Interconnect

Partially Populated Drawer

One Physical node
- **Chips**
  - Two PU chips, One SC chip
- **Redundant array of independent memory (RAIM) Memory**
  - Two Memory Controllers: One per PU
  - Five DDR3 DIMM slots per PU Chip Memory Controller
  - Populated DIMM slots: 10

**SC and PU Chip Interconnects**
- SC and PU Chip Interconnects
- X-bus: SC L4 and CP L3s to each other (same node)

Note: Both z114 and zBC12 have one node per CPC drawer with two PU SCMs, five DIMMs per PU SCM and one System Control SCM. The PU SCM L3 Caches are not connected directly. L4 cache design is inclusive of the L3s.
**Two Physical Nodes**
- **Chips**
  - Two PU chips per node
  - One SC chip per node
- **RAIM Memory**
  - Four Memory Controllers: One per PU
  - Five DDR3 DIMM slots per PU chip Memory Controller
  - Populated DIMM slots: 10 or 20
- **SC and CP Chip Interconnects**
  - X-bus: SC L4 and CP L3s to each other (same node)
  - S-bus: SC L4 to SC L4 in the drawer

**Note**: Both z114 and zBC12 have one node per CPC drawer with two PU SCMs, five DIMMs per PU SCM and one System Control SCM. The PU SCM L3 Caches are not connected directly. L4 cache design is inclusive of the L3s.
**z Systems Cache Topology – zBC12 vs. z13s**

**zBC12**

- **L1:** 64KI + 96KD
  - 6w DL1, 4w IL1
  - 256B line size

- **L2:** Private 1MB Inclusive of DL1
  - Private 1MB Inclusive of IL1
  - 12w Set Associative
  - 256B cache line size

- **L3:** Shared 24MB Inclusive of L2s
  - 12w Set Associative
  - 256B cache line size

- **L4:** 192MB Inclusive
  - 24w Set Associative
  - 256B cache line size

**z13s node**

- **L1:** 96KI + 128KD
  - 8w DL1, 6w IL1
  - 256B line size

- **L2:** Private 2MB Inclusive of DL1
  - Private 2MB Inclusive of IL1

- **L3:** Shared 64MB Inclusive of L2s
  - 16w Set Associative
  - 256B cache line size

- **L4:** 480MB + 224MB Non-Data Inclusive Coherent Directory
  - 30w Set Associative
  - 256B cache line size

*Note: Not all 8 cores are used in z13s. 6/7 cores per PU chip are active.*
### Processor options and memory

<table>
<thead>
<tr>
<th>Model</th>
<th>Drawers / PUs</th>
<th>CPs</th>
<th>IFLs uIFLs</th>
<th>zIIPs</th>
<th>ICFs</th>
<th>Std. SAPs</th>
<th>Optional SAPs</th>
<th>Std. Spares</th>
<th>IFP</th>
<th>Max. Memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>N10</td>
<td>1/13</td>
<td>0-6</td>
<td>0-10</td>
<td>0-6</td>
<td>0-10</td>
<td>2</td>
<td>0-2</td>
<td>0</td>
<td>1</td>
<td>984 GB</td>
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<tr>
<td>L10</td>
<td>1/13</td>
<td>0-1</td>
<td>0-10</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0-2</td>
<td>0</td>
<td>1</td>
<td>984 GB</td>
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<td>N20</td>
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<td>0-20</td>
<td>0-12</td>
<td>0-20</td>
<td>3</td>
<td>0-3</td>
<td>2</td>
<td>1</td>
<td>2008 GB</td>
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<tr>
<td>L20</td>
<td>1/26</td>
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<td>0</td>
<td>0</td>
<td>3</td>
<td>0-3</td>
<td>2</td>
<td>1</td>
<td>2008 GB</td>
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<td>N20+</td>
<td>2/26</td>
<td>0-6</td>
<td>0-20</td>
<td>0-12</td>
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<td>3</td>
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<td>4056 GB</td>
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<td>L20+</td>
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<td>0-1</td>
<td>0-20</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>0-3</td>
<td>2</td>
<td>1</td>
<td>4056 GB</td>
</tr>
</tbody>
</table>

- On models L10/L20 there can be only one CP at capacity setting C01 which may only be used for the GDPS appliance
- L10/L20 models have a different cover from the N10/N20 models
- N20/L20 models are a one- or two- drawer system with same processor feature counts for both configurations
- N20/L20 – second drawer is added when additional fanouts (N20) or more than 2008 GB memory are needed
- The maximum number of logical ICFs or logical CPs supported in a CF logical partition is 16
- The integrated firmware processor (IFP) is used for native PCIe I/O support functions
- Upgrades from N10/L10 to N20/L20 and N20/L20 to N20+/L20+ are disruptive
- SMT is supported with processor types IFL and zIIP
### Model N10/L10 Memory

<table>
<thead>
<tr>
<th>N10 Physical Memory RAIM GB</th>
<th>Client GB</th>
<th>Increment GB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addressable Memory GB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32 RAIM (2 x 16GB) - 128 for HSA (40) + Client (88)</td>
<td>64 72 80 88</td>
<td>8</td>
</tr>
<tr>
<td>64 RAIM (2 x 32GB) - 256 for HSA (40) + Client (216)</td>
<td>120 152 184 216</td>
<td>32</td>
</tr>
<tr>
<td>128 RAIM (2 x 64GB) - 384 for HSA (40) + Client (344)</td>
<td>248 280 312 344</td>
<td>32</td>
</tr>
<tr>
<td>128 RAIM (2 x 64GB) - 512 for HSA (40) + Client (472)</td>
<td>408 472</td>
<td>64</td>
</tr>
<tr>
<td>256 RAIM (2 x 128GB) - 640 for HSA (40) + Client (600)</td>
<td>536 600</td>
<td>64</td>
</tr>
<tr>
<td>256 RAIM (2 x 128GB) - 1024 for HSA (40) + Client (984)</td>
<td>728 856 984</td>
<td>128</td>
</tr>
</tbody>
</table>

- 2965 has the same RAIM Memory infrastructure as zBC12
- Minimum client memory is 64 GB
- HSA is 40 GB (vs. 16 GB on zBC12)
- Memory upgrades that require DIMM changes are disruptive
- Plan Ahead Memory can be added to eliminate disruption
- On both models, memory upgrades within each row (same color) are concurrent without adding Plan Ahead Memory
Large Memory – Potential Performance Gains

- **Potential latency reduction for OLTP workloads**
  - Response time reductions
  - Increased transaction rates

- **Enables in-memory databases**
  - Dramatic reduction in response time by avoiding I/O wait

- **Batch window reduction**
  - More concurrent工作loads
  - Shorter elapsed times for jobs

- **Reducing time to insight for analytic workloads**
  - Process data more efficiently – keep pace with influx of data
  - Reduces time to get from raw data to business insight

- **CPU performance improvements**
  - Improves response time and shrinks batch windows
  - Reduce the need for application/system redesign to meet service goals
  - Reduction in CPU time per transaction
    - Run more work at the same hardware and software MSU rating
    - Run the same workload with lower hardware and software MSU rating
References on Large Memory Exploitation

- z/OS Infrastructure Optimization using Large Memory

- Benefits of Configuring More Memory in the IBM z/OS Software Stack

- Advantages of Configuring more DB2 Buffer Pools

- SAP memory white paper
I/O features supported

- **PCIe drawer**
  - FICON Express16S (SX and LX, 2 SFPs, 2 CHPID) at 16 Gbps, 8 Gbps, 4 Gbps
  - FICON Express8S (SX and LX, 2 SFPs, 2 CHPID) at 8 Gbps, 4 Gbps, 2 Gbps
  - OSA-Express5S
    - 10 GbE LR and SR (1 SFP, 1 CHPID)
    - GbE SX, LX, and 1000BASE-T (2 SFPs, 1 CHPID)
  - 10 GbE RoCE Express (2 supported SR ports)
  - zEDC Express
  - Crypto Express5S
  - Flash Express
  - Integrated Coupling Adapter (ICA) – ICA SR two 8 GBps PCIe Gen3 Coupling Link (and future DS8880 Hyperlink)

- **Processor drawer**
  - InfiniBand Coupling fanouts
    - HCA3-O two 12x 6GBps InfiniBand DDR Coupling Links
    - HCA3-O LR four 1x 5Gbps InfiniBand DDR or SDR Coupling Links
I/O Subsystem Internal Bus Interconnect Speeds

- **PCle Gen3 z13**: 16 GB/sec
- **PCle Gen2 z114/z196 / z12**: 8 GB/sec
- **IFB z10 / z114/z196 / z12**: 2.7 GB/sec
- **eSTI z9**: 2 GB/sec

Measured in GB/sec
IFB: Infiniband
eSTI: Self-Timed Interface
FICON Express16S – SX and 10KM LX

- For FICON, zHPF, and FCP environments
  - CHPID types: FC and FCP (Two PCHIDs/CHPIDs)
- Auto-negotiates to 4, 8, or 16 Gbps
  - 2Gbps connectivity NOT supported
  - FICON Express8S will be available to order for 2Gbps connectivity
- Increased I/O Devices (subchannels) per channel for all FICON features:
  - TYPE=FC: Increased from 24k to 32k to support more base and alias devices
- Increased bandwidth compared to FICON Express8S
- 10KM LX - 9 micron single mode fiber
  - Unrepeated distance - 10 kilometers (6.2 miles)
  - Receiving device must also be LX
- SX – 50 or 62.5 micron multimode fiber
  - Distance variable with link data rate and fiber type
  - Receiving device must also be SX
- Two channels of LX or SX (no mix)
- Small form factor pluggable (SFP) optics
  - Concurrent repair/replace action for each SFP

FC 0409 – 10KM LX, FC 0410 – SX

LX/LX or SX/SX

OM3

OM2
FICON performance on z Systems

I/O Driver Benchmark

I/Os per second

4k block size, Channel 100% utilized

<table>
<thead>
<tr>
<th>I/O Driver Benchmark</th>
<th>I/Os per second</th>
</tr>
</thead>
<tbody>
<tr>
<td>FICON Express4</td>
<td>14000</td>
</tr>
<tr>
<td>FICON Express8S</td>
<td>23000</td>
</tr>
<tr>
<td>FICON Express8S zHPF</td>
<td>92000</td>
</tr>
<tr>
<td>FICON Express16S</td>
<td>23000</td>
</tr>
<tr>
<td>FICON Express16S zHPF</td>
<td>98000</td>
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</tbody>
</table>

I/O Driver Benchmark

MB per second

Full-duplex, Large sequential, read/write mix

<table>
<thead>
<tr>
<th>I/O Driver Benchmark</th>
<th>MB per second</th>
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</thead>
<tbody>
<tr>
<td>FICON Express4</td>
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</tr>
<tr>
<td>FICON Express8S</td>
<td>620</td>
</tr>
<tr>
<td>FICON Express8S zHPF</td>
<td>1600</td>
</tr>
<tr>
<td>FICON Express16S</td>
<td>620</td>
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<tr>
<td>FICON Express16S zHPF</td>
<td>2600</td>
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</table>
Integrated Coupling Adapter (ICA SR)

- Integrated Coupling Adapter SR (ICA SR) in the CPC drawer
- Recommended for short distance coupling z13/z13s to z13/z13s, not available on older servers
- No performance degradation compared to coupling over Infiniband 12X IFB3 protocol

Hardware details
- Short reach adapter, distance up to 150 m
- Up to 40 ports (z13) or 16 ports (z13s) maximum
- IOCP Channel Type = CS5

Feature code 0172, 2 ports per adapter
- Up to 4 CHPIDs per port, 8 per feature, 8 buffers (i.e. 8 subchannels) per CHPID

ICA requires new cabling for single MTP connector
- Differs from 12X Infiniband split Transmit/Receive connector

Requirements
- CF: z13/z13s; z/OS: z13/z13s
- z/OS 2.3 (or z/OS V2.2 or V2.1 with PTFs for APARs OA44440 and OA44287)
IBM will announce new long range coupling links for the z13/z13s
- These are based on new RoCE features and will use the same fibre as IFB 1x links
- Announcement may come in 2Q2017 or in 3Q2017

zNext HE will be the last HE processor to support IFB links

z13s will be the last Mid-Range (MR) processor to support IFB 1x links

z13s will be the last MR processor to support IFB 12x links (SoD dated 2016-02-16, z13s announcement)
- Thus, zNext MR will NOT support any IFB links (1x or 12x)

Note: zNext HE (high-end) will be the follow-on processor to the z13; zNext MR (mid-range) will be the follow-on processor to the z13s
<table>
<thead>
<tr>
<th>Sysplex Coexistence</th>
<th>N-3</th>
<th>N-2</th>
<th>N-1</th>
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<tr>
<td>z196 / z114</td>
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</tr>
<tr>
<td>ISC3</td>
<td>NB &amp; CF</td>
<td>CF</td>
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<td>Not Available</td>
<td>Not Available</td>
<td>Long Distance Lower Bandwidth</td>
</tr>
<tr>
<td>HCA2-O 12x</td>
<td>NB &amp; CF</td>
<td>CF</td>
<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
<td>Short Distance High Bandwidth</td>
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<tr>
<td>HCA2-O 1x LR</td>
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<td>CF</td>
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<td>Not Available</td>
<td>Not Available</td>
<td>Long Distance Lower Bandwidth</td>
</tr>
<tr>
<td>HCA3-O 12x</td>
<td>NB</td>
<td>NB &amp; CF</td>
<td>NB &amp; CF</td>
<td>NB &amp; CF</td>
<td>Not Available</td>
<td>Short Distance High Bandwidth</td>
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<tr>
<td>HCA3-O 1x LR</td>
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<td>NB &amp; CF</td>
<td>NB &amp; CF</td>
<td>NB &amp; CF</td>
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<td>Long Distance Lower Bandwidth</td>
</tr>
<tr>
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<td>Not Available</td>
<td>NB</td>
<td>NB</td>
<td>NB</td>
<td>Short Distance High Bandwidth</td>
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<tr>
<td>ICA LR</td>
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<td>Not Available</td>
<td>NB</td>
<td>NB</td>
<td>NB</td>
<td>Long Distance Lower Bandwidth</td>
</tr>
<tr>
<td>Internal Coupling</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Internal to server only High Bandwidth</td>
</tr>
</tbody>
</table>

NB = New Build, Technology Exchange, Migration Offering
CF = Carry Forward, available via MES upgrade from previous technology only
A zBC12 may NOT directly connect in a sysplex to a zNext MR
Migration must be complete from zBC12 to z13s for those machines with CFs before zNext MR is introduced into the sysplex
The z13s machines would need to have both HCA3-O fanouts and ICA-SR ports to connect to the zBC12 and zNext MR machines

Note: The link data rates do not represent the performance of the link. The actual performance is dependent upon many factors including latency through the adapters, cable lengths, and the type of workload.
IBM Dynamic Partition Manager
IBM Dynamic Partition Manager – At a Glance

- Provide simplified, consumable, enhanced Partition life-cycle and integrated dynamic I/O management capabilities
- A CPC can be in Standard PR/SM mode or IBM Dynamic Partition Manager (DPM) mode (enable DPM mode with first IML)
- Provides the technology foundation that enables IaaS and secure, private Clouds
- Initial focus on First In Enterprise (FIE) customers
- A CPC running in DPM mode is Linux only with support for the z/VM and KVM hypervisors and only FCP Storage
Enabling IBM Dynamic Partition Manager

- Support Element will reboot when switching between PR/SM modes
- The entire CPC is in DPM or Standard PR/SM mode
- Nothing carried forward from standard PR/SM to IBM Dynamic Partition Manager
- A CPC can be reverted back to Standard PR/SM
- Prior Standard PR/SM configuration restored
- SERVICE or SYSPROG IDs can Enable/Disable DPM
- HMCs can manage both DPM and Standard PR/SM CPCs simultaneously
IBM Dynamic Partition Manager initial device support

- Device definition performed graphically at the HMC
- Supports dynamic changes to device definitions

<table>
<thead>
<tr>
<th>Supported Devices</th>
<th>Devices not supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>- OSA-Express5S</td>
<td>- ECKD Disk</td>
</tr>
<tr>
<td>- zEnterprise Data Compression (zEDC)</td>
<td>- Flash Express</td>
</tr>
<tr>
<td>- HiperSockets</td>
<td>- Shared Memory Communications-Direct (SMC-D)</td>
</tr>
<tr>
<td>- FCP attached HBAs for disk or tape</td>
<td></td>
</tr>
<tr>
<td>- Crypto Express 5S</td>
<td></td>
</tr>
<tr>
<td>- 10 GbE RoCE Express</td>
<td></td>
</tr>
</tbody>
</table>
Linux and Blockchain on IBM z Systems
Who is using Linux on IBM z Systems today

Used in 50 countries across 21 industries around the globe

- Most used in:
  - Banking and Financial Markets
  - Government
  - Insurance
  - Computer Services
  - Retail and Healthcare
  - Transportation and Telecommunication

- 93 of the top 100 z Systems clients are running Linux on IBM z (based on total installed MIPS in 4Q2016)
- 48% of z Systems clients have IFLs installed
- Very large installations with up to hundreds of cores/IFLs in USA, Japan, Brazil, Germany, UK, and South Africa
- Small installations with 2 IFLs in all countries and on all z Systems models
Blockchain and z Systems: Working in synergy

A new streamlined way to create an official record of transactions without going through a central point of control.

Exploiting the speed, security, availability and specialized technologies of the IBM z platform and integrating with the systems of record that run on it.

Apache Hyperledger Project

- “Collaborative effort created to advance Blockchain technology by identifying and addressing important features for a cross-industry open standard for distributed ledgers that can transform the ways business transactions are conducted globally.”
- Significant investment by IBM, notable members include Accenture, IBM, JPMC, R3CEV, CISCO, VMware, SWIFT
- Currently at version 0.6, version 1.0 will become available in 2017
Blockchain on IBM z Systems

IBM Delivers Blockchain-As-A-Service for Developers; Commits to Making Blockchain Ready for Business
- New IBM Cloud Services Help Developers Put Blockchain Codes to Work
- IBM Garages in London, New York, Singapore and Tokyo to Help Banking and Financial Services and other Industries Start Using Blockchain
- IBM Offers 44,000 Lines of Code as Founding Member of the Linux Foundation's Hyperledger Project

IBM Launches First Highly Secure Blockchain Services for Financial Services, Government and Healthcare on IBM Cloud
- BNY Mellon leads in piloting IBM Garage services
- Empowers developers to run IBM's Blockchain using Docker containers

IBM Delivers Blockchain-As-A-Service for Developers; Commits to Making Blockchain Ready for Business
- New IBM Cloud Services Help Developers Put Blockchain Codes to Work
- IBM Garages in London, New York, Singapore and Tokyo to Help Banking and Financial Services and other Industries Start Using Blockchain
- IBM Offers 44,000 Lines of Code as Founding Member of the Linux Foundation's Hyperledger Project

IBM Launches Cloud Services for Blockchain on Industry's Most Secure Server
- New cloud environment for business-to-business networks allows companies to test performance, privacy and interoperability of blockchain ecosystems
- Everledger taps IBM Blockchain to track diamonds and other valuables
- IBM LinuxONE undertakes cloud offering to help meet stringent industry and compliance security requirements

IBM Moves Blockchain to the Supply Chain Realm
Startup Everledger, which helps companies track the provenance of diamonds worldwide, is testing IBM Blockchain.

THE WALL STREET JOURNAL

IBM Launches Blockchain Cloud Services on High Security Server, LinuxONE

IBM Defines Security Standards For Running Blockchain In The Cloud

Forbes

IBM Unveils New Cloud Blockchain Security Service

CoinDesk
IBM Blockchain Offerings
All running Hyperledger Fabric

IBM managed on IBM cloud

**Starter**
- Start writing chaincode in seconds
- Integrated dashboard, logs and tools
- Community samples, tutorials, and quickstarts

**High Security Business Network**
- High performance and reserved capacity
- Best in Industry security, isolation and spec support
- Proven Audit environment for compliance and forensics

---

**IBM Blockchain Starter for Developers**
- Public Beta
  - provision now on IBM Bluemix!

**IBM Blockchain for High Security Business Networks**
- Generally Available
  - Available on IBM Bluemix!

**Support for Hyperledger Fabric**
- Generally Available
  - [https://hub.docker.com/r/ibmblockchain/fabric/](https://hub.docker.com/r/ibmblockchain/fabric/)

---

IBM offers technical support for x86, Power and z Systems
Provide a highly secure LPAR that enables new Blockchain solutions to be easily packaged as a full runtime environment including all components: Operating Systems, Software, APIs, etc.

- Solutions built using SSCs are encrypted and can only be executed within this tamper-proof LPAR
- Detection and response to unauthorized access attempts
- No root access to the operating system (protection from system administrators)
- Tamper resistant storage of the crypto keys using IBM Crypto Express5S
- No other platform provides this capability
z Systems facilitates Blockchain applications that can access existing transactional systems (CICS, IMS, DB2) that are on z Systems via APIs to support the new business processes
– Leverages decades of investment in these systems
– Blockchain will not replace these, as these focus on driving efficiency within an organization
– Blockchain is focused on driving efficiency between organizations

Most likely model will be a hybrid cloud model with Blockchain securely feeding into or out of the front end of a mainframe to work with the data in CICS, IMS, and DB2
Managing IBM z/OS Software Charges
Managing IBM z Systems software charges

- **Mobile Workload Pricing (not new with z13)**
  - MSUs reduced by 50% for new mobile application growth

- **Typical “Technology Upgrade Pricing” benefits apply**
  - Average may be higher than the usual 5%

- **z Systems Collated Application Pricing (zCAP)**
  - Applications don’t have to be isolated in LPAR like zNALC did
  - Associated z/OS MSU increase at 50%; zero for DB2, CICS, IMS, etc.
  - VUE-versions of DB2 and CICS

- **Country Multiplex Pricing**
  - No need for SVC any more; no SVC term restrictions
  - Country level software pricing aggregation without sysplex rules

- **Multi-Version Measurement**
  - No need for SVC any more; no SVC term restrictions
Introducing Multi-Version Measurement

What Multi-Version Measurement is:
- An extension (and renaming) of a price offering that was originally introduced for Country Multiplex Pricing (CMP) clients – and will now be available to all z/OS and z/VSE clients.
- A complete replacement for all three of the existing SVC, MPO and the IPLA Migration Grace Period price offerings.

What Multi-Version Measurement does:
- Removes all the time limit restrictions associated with SVC, MPO and the IPLA Migration Grace Period.
- Dramatically simplifies pricing by replacing three completely different pricing policies with one single, more flexible, standard policy.
Key benefits of Multi-Version Measurement

- Eliminates the possibility of being charged separately for multiple versions
- **MVM has no time limits during a temporary upgrade period**
  - Clients will have much more control over their upgrade cycles, allowing them to prioritize and stage software upgrades as their business requirements demand.
  - Clients will have much more flexibility to react to unforeseen issues by altering their upgrade projects plans, without needing to notify IBM or apply for technical waivers.
- **MVM has no time limits during longer-term production deployments**
  - Clients can now deploy new capabilities delivered in new software versions for specific projects that require them, without also being required to upgrade everything else.
  - In cases where some older and less critical workloads cannot easily be upgraded, clients can now choose to leave those on an older version, while upgrading everything else.
How Multi-Version Measurement works

- **Multiple versions will be treated like multiple releases within a version**
  - All versions and releases are reported and charged as though they were a single version.
  - The price point applied will be that of the latest version licensed.
  - This is identical to how multiple releases with a version are charged today.

![Diagram](https://via.placeholder.com/150)

- Releases within a version are already measured like this ➔

  ![Diagram](https://via.placeholder.com/150)

  - CICS TS V5.1 + CICS TS V5.3 = CICS TS V5

- Under MVM, versions are measured in the same way ➔

  ![Diagram](https://via.placeholder.com/150)

  - CICS TS V4.2 + CICS TS V5.2 = CICS TS ALL

- This is identical to how the Operating System (All) MSUs are currently reported and charged under MPO (the only difference being that there is no longer a time limit).
What programs are eligible for Multi-Version Measurement?

- **Practically all IBM z Systems software programs are eligible**
  - All supported (along with many recently unsupported) versions of almost all IBM MLC and IBM OTC software products, including z/OS, CICS, DB2, IMS, MQ, z/VSE, etc.
  - It is anticipated that almost all clients will be able to move to MVM for their entire IBM z Systems software inventory.
  - Full lists of products reported by SCRT available and will be maintained at these websites
  - All IPLA (OTC) programs with multiple versions are eligible for MVM
    - e.g. Reference-Based, z/OS-Based, Full Machine Based, non-MSU based, etc.

- **Notable Exception**
  - Very old and out of support MLC programs (i.e. OS COBOL, OS PL/I) not reported by SCRT
Automatic SVC, MPO and IPLA Migration Grace Period extensions
– All existing SVC, MPO, and IPLA Migration Grace Periods expiring between 14 February 2017 and 30 May 2017 are automatically extended to 31 May 2017.

Sub-capacity clients must take action to ensure conversion
– Sub-capacity clients must submit an SCRT report using SCRT V24.2.0 (Classic) or SCRT V24.11.0 (Java), planned to be made available on 10 April 2017.
– Use one of these new SCRT releases to generate SCRT Report with April data, submit it May 2-9, then Sub-Capacity MVM will go into effect with 1 June 2017 bill.
– Until the above release of SCRT reports are submitted, previous pricing rules apply.

Full-capacity SVC and MPO clients will be converted automatically
– Full-capacity clients will have SVCs and MPOs converted to MVM on 1 June 2017.
IBM z/OS 2.3 Preview
**Cloud Enablement for z/OS**
- Vision: Provide a simple, consumable approach for self-service provisioning and rapid delivery of aaS, while enabling for the API Economy. This allows customers to convert from an IT cost center to a value generating model.

**z/OS Security Enhancements**
- Vision: Provide a simple, transparent, and consumable approach to enable extensive encryption of data in-flight and at-rest to substantially reduce the costs associated with protecting data and achieving compliance mandates.
- Deliver z Systems operating system infrastructure to enable encryption of data by policy, without application change.

**z/OS Simplification**
- Vision: Simplify the overall management of the z/OS ecosystem, increasing the productivity and value of system administrators and easing the on-boarding of new team members.
### Usability and Skills
- z/OSMF Configuration Assistant enhancements for TCP/IP (import, dynamic updates, support for Disaster Recovery configurations), Sysplex Management stage I, Incident Log, Software Management, SMP/E improvements, z/OSMF AutoStart, ...

### Application Development
- z/OS UNIX System Services support for Years 2038, Year 2042 TOD Clock Issue, e-Mail notification for job completion, Web Enablement Toolkit Enhancements, ISPF Improvements, ...

### Scalability and Performance
- RMODE 64, Open Data Set Constraint Relief, SMF Constraint Relief, SMF real-time APIs, VSAM RLS Constraint Relief, ...

### Enhancing Security
- SAF Security Deployment Descriptor, Encrypting access methods, FIPS Mode for System SSL Services, Network Authentication Services Improvements, Audit Key Lifecycle Events & FIPS Mode Audit Trail, CF Encryption ...

### Availability
- zFS dynamic attribute changes, SSL hardware auto-detect, HFS to zFS online migration tool, JES2 Resiliency – Spool management, Runtime Diagnostics deadlock detection, ...

### Systems Management
- JES3 to JES2 Migration aids, 8-Character TSO/E User IDs, BCPii Performance and constraint relief, VTOC Update SMF records, zFS Shrinking, KC4Z Improvements, zFS Improvements, ...

### Networking
- SMC-D, Improved reporting of Network Security Encryption protocol usage, ATTLS Currency, ...
## z/OS Support Summary

<table>
<thead>
<tr>
<th>Release</th>
<th>z900 / z800 WdFM</th>
<th>z990 / z890 WdFM</th>
<th>z9 EC / z9 BC WdFM</th>
<th>z10 EC / z10 BC WdFM</th>
<th>z196 / z114 WdFM</th>
<th>zEC12 / zBC12 WdFM</th>
<th>z13 / z13s</th>
<th>End of Service</th>
<th>Extended Defect Support</th>
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<td>9/2022*</td>
<td>9/2025*</td>
</tr>
</tbody>
</table>

**Notes:**
* All statements regarding IBM's plans, directions, and intent are subject to change or withdrawal without notice.

WdFM – Server has been withdrawn from Marketing

**Legend**
- Defect support provided with IBM Software Support Services for z/OS
- Generally supported
**Hardware Support**

- **DS8880 – planned zHyperLink support**
  - Short distance mainframe link
  - Up to 10x lower latency expected over High Performance FICON
  - Uses ICA-SR features on the z13s

- **DS8K – Transparent cloud tiering**
  - Command based migration of large data sets for which a slow recall time is acceptable
    - Compressed with zEDC
    - Data set level encryption
2042 TOD clock
- The z/OS 8-byte Store Clock (STCK) TOD clock timestamp will wrap in the year 2042 (and wrap for any “future date/time” calculation that extends beyond 2042), which may cause many kinds of problems for programs using such timestamps
- The existing Store Clock Extended (STCKE) instruction provides a 16-byte clock/timestamp that greatly extends the time until the clock wraps
  - Clock is extended on the left with a 1-byte “epoch index” into which the clock can wrap, and on the right with finer-granularity stepping bits
- Programs that use 8-byte STCK-format timestamps need to investigate their usage and take remedial actions if necessary to avoid wrap-related problems
  - Convert to 16-byte STCKE-format timestamp usage instead
  - Extend existing 8-byte STCK-format clock/timestamp with an epoch index, contiguous or not, effectively implementing a 9-byte timestamp
  - Use “windowing” techniques in conjunction with existing 8-byte STCK-format clock usage, e.g. treat wrapped values as representing dates/times occurring post-2042, rather than occurring early in the 20th century (pre-1972)
  - “No change needed” – existing 8-byte STCK timestamp usage is OK
- Consider timestamps present in APIs/externals, hardened record formats, future-date calculations such as expiration dates, interval calculations, etc.
- z/OS will start down the road to remediating this issue in z/OS system code in z/OS v2.3
  - Note: z/OS v2.3 Does not support running the clock beyond 2042
Hardware Support

- **ICSF Web Deliverable #16**
  - Audit Key Lifecycle Events and FIPS Mode Audit Trail
    - Improved Auditing Capability for customers doing full lifecycle Key Management
    - Audit the complete life cycle of key material: Generation, Updates, Deletions, Imports, Exports, Archival, Restore
    - Customers want assurances that every request to which FIPS-compliance applies is being processed in a FIPS-compliant manner. For all such requests, ICSF will cut an audit record if the request is successful or if the request was failed due to non-FIPS-compliance.
  - FIPS
    - SSL Dependency Certification SPE
  - Active/Active Support for ICSF VSAM KDSs
    - Another part of the Active/Active solution
    - Provides a GDPS (Geographically Dispersed Parallel Sysplex) disaster recovery solution which includes the ICSF KDSs
  - Options Dataset Refresh
    - Dynamic update to installation options data set
    - Customer will no longer need to restart ICSF to pick up most of the options
Usability and Skills

- **z/OSMF Updates**
  - Incident log
    - Attach PDS/E to an incident to simplify problem reporting
  - z/OSMF 2.2 shipped back to z/OSMF 2.1
    - New look and feel
    - Improved install
  - Notification updates
    - Email notification
    - Push notification
  - RMF application automatic DDS updates
  - Improved files and data sets REST API
Usability and Skills

**z/OSMF Updates**
- Incident log
  - Manually-created incidents (not originated via SVC Dump)
  - APAR search from within an incident with z/OSMF-generated search arguments
- Software management
  - Remove requirement for an SMP/E zone to define a software instance; allows Software Management to manage non-SMP/E-packaged software distribution within an enterprise
  - Export a software instance (creates a portable format that is SMP/E-agnostic)
  - Import an exported software instance
  - API extensions
- User display capability
  - “Who’s using z/OSMF right now?”
  - What are people using in z/OSMF
Usability and Skills

- **z/OSMF Updates**
  - z/OSMF “AutoStart”
    - Must be configured and running somewhere in the sysplex
      - IZUPRMxx may be specified in IEASYSxx
    - Improved installation experience for base server
    - Improved first time user experience
    - Improved first time administration experience
  - More dynamic configuration
    - Most actions are available in the z/OSMF UI for managing z/OSMF
    - For example
      - Setting up the header/footer and gif on the main page
      - Selecting optional plug-ins
  - z/OS Cloud – middleware provisioning
    - Roll up from v2.2
    - Introduces catalog, registry, editor and tenants
    - Basic Metering and capping
Usability and Skills

▪ z/OSMF Updates
  – Parallel Sysplex management
    • Stage 1 in the z/OS 2.3 timeframe provides display-only capabilities for sysplex resources such as z/OS systems, coupling facilities, coupling facility structures, programs using coupling facility structures, couple datasets and the policies they contain, coupling link connectivity resources, etc.
      o Graphical and tabular displays
      o Physical and logical views of sysplex resources
      o Visualizations and drill-downs
Usability and Skills

- **z/OSMF Updates**
  - Console application
    - Provide ability to see messages on browser in real time
Usability and Skills

- **z/OSMF Updates**
  - Workflow engine
    - Improved security allowing more granular control over who can see workflows and workflow steps
    - Support for immediate REXX and Script execution
    - More flexible Job Card information
  - SDSF browser UI
    - Added features including ENQ and SYM
Scalability and Performance

- **RMODE 64 roadmap continues**
  - Contents Supervisor and Loader infrastructure
  - Binder support
  - Target is enough to support the Java JIT

- **SMC-D (Direct)**
  - Local Shared Memory Communications for LPAR-to-LPAR links within a box
  - Like HiperSockets but faster, much less overhead and lower latency
  - **Performance Improvements**
    - Up to 61% CPU savings for FTP file transfers across z/OS systems versus HiperSockets*
    - Up to 9x improvement in throughput with more than a 88% decrease in CPU consumption and a 90% decrease in response time for streaming workloads versus using HiperSockets*
    - Up to 91% improvement in throughput and up to 48% improvement in response time for request/response workloads versus using HiperSockets*
  - RMF is updated for SMC-D channel path activity and PCI activity

*All performance information was determined in a controlled environment. Actual results may vary. Performance information is provided “AS IS” and no warranties or guarantees are expressed or implied by IBM.*
Scalability and Performance

- Larger log stream staging data sets
  – Support for extended addressability (>4GB) staging duplex data sets
  – Keep ahead of data rates for logging functions
- SMF constraint relief
  – Expand available IBM-reserved record name space
  – Using remaining reserved bit and one of the IBM types, SMF will compatibly extend the SMF header to allow for up to 2048 record types, increasing the name space for both IBM and non-IBM record types
- Workload manager improvements
  – Performance goals can now be set at a lower level of granularity
  – Updates to allow separation of workloads that consume specialty engine capacity
  – Resource groups enhanced to limit the real storage for the associated service classes
  – Support for absolute MSU capping (soft cap limit regardless of 4 hour rolling average)
Scalability and Performance

- **SMF real-time APIs/services**
  - New real-time SMF services provided on top of existing buffer technology
  - Define new ‘real-time resources’ for specific records
  - Request SMF records only to a real-time resource – no disk required
    - Can co-exist with current SMF data set/logstream technology
  - APIs allow application to access SMF data as it is buffered
    - Unauthorized access policed via SAF
    - Connect/Get/Disconnect model similar to traditional QSAM access
  - Potential use cases include:
    - Detecting security violations in real-time
    - Real-time monitoring resource usage
    - Job scheduling optimizations

- **High frequency throughput statistics**
  - New SMF 98 record
  - Details about dispatching, locking and queueing

- **WLM SYSPLEX routing**
  - Planned to be sensitive to upcoming, but not yet active, soft capping
Scalability and Performance

- **Open data set constraint relief**
  - Improved performance and scalability for workloads such as DB2
    - As customers consolidate workloads, and DB2 encourages customers to put one DB2 table per data set, the number of data sets needed goes up dramatically
  - Enhancements in 2.3 are intended to allow the number of concurrent open data sets in a single address space to grow and to improve performance of data set close processing
  - Target is 400,000 open data sets per address space

- **VSAM RLS upgrade locking and constraint relief**
  - Improved performance for processing VSAM alternate indexes using RLS
    - Existing RLS upgrade locking causes all update requests for VSAM alternate index and base records to be single threaded
    - New “redo” processing allows concurrent update requests for improved performance, especially when updating many large records
  - Constraint relief with above the bar record storage
    - Additional enhancements in v2.3 for RLS requests will provide new 8 byte interfaces to allow the user to specify that the record area and argument reside above the bar in the user’s address space
Scalability and Performance

- **DFSORT performance improvements**
  - Improvement in CPU and elapsed time for several DFSORT function that generate runtime code
  - E15/E35 user exits updated to handle blocks of records
- **z/OS NFS client RSIZE/WSIZE**
  - RSIZE/WSIZE parameters can now be from 1kb to 64 kb
- **zFS compression**
  - Individual files can be compressed using zEDC compression technology
  - New and existing file systems are eligible for compression
  - File systems can be compressed while in use
- **XML system services exploits 64 bit addressability**
Availability

- **JES2 resiliency**
  - Dealing with limited resources
    - Spool space and control blocks in the JES2 checkpoint
  - Multi-facet approach
    - Better identifying what is consuming resources
      - Including top consumers by rate vs amount
      - More detailed tracking information
    - Reserved space for emergency situations
      - Ability to identify processes that can use reserved space
    - Static analysis of initialization settings in light of current usage
      - Are things poorly configured?
    - Historical tracking of resource usage over time
      - Creating new (to JES2) SMF records
  - Intent is to:
    - Better identify shortages before they happen
    - Give installation standard tools to manage system in shortage
Availability

- **SSL hardware auto-detect**
  - System SSL to detect availability of crypto card
  - Optionally, drive software encryption while card is unavailable
  - Shift back to hardware when card comes back

- **Online migration from HFS to zFS**
  - Conversion on the fly, with no application outage
  - Part of the effort to make the release after z/OS v2.3 be the last release to support HFS

- **PKI Services tolerance of DB2 availability**
  - PKI services will either shut down or wait when DB2 is unavailable

- **New support for secondary volumes**
  - SAM and VSAM provide read-only access to data sets that reside on PPRC secondary volumes
Availability

- **Runtime diagnostics deadlock detection**
  - Follows the blockers of ENQUEUE contention
  - Follows the blockers of GRS latch contention
  - Support is sysplex enabled

- **zFS online salvage**
  - New command to initiate an online salvage of a zFS aggregate

- **XRC Resiliency**
  - XRC increased buffer storage will reduce transient events
• z/OS UNIX file system management
  – Reduce the size of an online zFS dynamically ("zFS shrinking")
  – Dynamic zFS attribute changes
    • For example: change RWSHARE (read-write share) attribute
  – Compressed zFS file system and/or files in the file system
  – SMF accounting support for zFS
    • Type 92 used to record important events and performance indicators (e.g. monitoring dynamic growing or disablement of an aggregate and general performance information)
  – Unmount not-in-use Version Root
  – Extend user mount capability to allow mounting of filesystems in a privileged manner

• 8 character TSO/E user IDs
  – Enable use of 8 character TSO/E user ids, removing the current 7 character limit
  – Help customers close auditing exceptions
  – Consistency with job name length maximum
Knowledge Center for z/OS (KC4Z)
- Upgrade to KC 1.5
- Capability to look up message and codes
- Improved search

Healthchecker
- Filter support for parmlib – e.g. system name, sysplex name
- Syntax check entire parmlib member

JES3 to JES2 migration aids
- JES2 to consume most JES3 JECL
- To be translated to JES2 equivalents where possible
  - Some are not possible...e.g., JES2 does not have a “JGLOBAL”

Sub-Capacity Reporting Tool (SCRT)
- SCRT is now included as a component of z/OS
  - Continues to be available as a web download
- SCRT is made available for ISVs to generate ISV-based reports
Systems Management

▪ **NFS Server**
  – Export enhancements
  – Allows for subdirectories under exported filesystem to be exported and different checklist parameters in paths under an exported directories

▪ **SMB**
  – Support for Windows server 2008/2012
  – Allow configurable name for the SMB started task name

▪ **GDGBIAS**
  – The GDGBIAS keyword on the JOB statement will allow the user to specify how generation data sets are treated across job steps, such that jobs that use GDGs will not need modified when restarted
    • Eliminates a common user mod

▪ **pax and tar improvements**
  – Support long file names and long link names generated by GNU utilities
**Systems Management**

- **z/OS BCPii improvements**
  - Performance improvements
    - All queries for activation profile, capacity record, and user-defined image group connections
    - Set of multiple attributes can be done on a single API call
    - With GA2 of z13/z13s some cases are more than 10x faster
  - Constraint relief
    - Amount of data that can be returned on a query request greatly increased (greater than 28k)
    - 5-digit IPL address support on HWICMD API for Load, SCSI Load and SCSI dump commands
    - Dynamic CPC name change
    - New set service allows for multiple attributes to be set simultaneously
  - Support for newer hardware attributes
    - Absolute capping
    - Absolute capping LPAR group

- **Common Event Adapter (CEA) cross system support**
  - The TSO launcher allows specification of a target system within a sysplex
- **VTOC update SMF records**
  - Prevent accidental corruption to the VTOC
    - New DFSMS CVAF interface provides checking to insure crucial fields are not being updated
      - A new parameter, VALIDATE=(YES,NO) will be added to indicate that the existing DSCB(s) will be read and compared to the ones passed by the user to ensure essential fields are not being modified
  - Additional logging of VTOC updates
    - DFSMS DADSM/CVAF will build SMF 42, subtype 27 record and include before/after DSCB image
    - New Volume Event SMF Record 42 Subtype 28 will log events that affect the entire volume

- **IBM Function registry for z/OS**
  - ISV extension for function discovery and enablement

- **Infoprint Server automatic failover**
  - Automatic failover of the primary printer to an alternate printer
  - Improved specification of form names using limited prefixes and wild cards
§ XCF Healthcheck
  – Improved reporting of system status detection environment requirements
  – Expanded checks on connection status to other active CPC images

§ CIM server Changes
  – New option to configure number of repository back-ups
  – Mechanism to automatically delete old repository back-ups
  – CIM server update to Open PEGASUS 2.14

§ /global
  – A new directory has been created in the sysplex root, that can be a repository for files that need to be consistent across a sysplex or when needing a convenient way to access multiple level of program products not shipped with z/OS
  – For "symmetry" this directory has also been created in the version root
  – Hence in non-sysplex situation, where the version root is root filesystem, this directory can be used to serve the same purpose
  – Recommendation: Create a new filesystem and mounted it on /global, so that the sysplex root isn't updated and being filled up with files, etc...
z/OS Communications Server

‒ Ease of Use: z/OS Configuration Assistant Enhancements – Defining TCP/IP configuration
  • Ability to import existing TCP/IP profiles and support for dynamic updates to existing configuration including issuing the VARY OBEY command

‒ Improved reporting of Network Security/Encryption protocols used by z/OS workloads
  • Address gap in common reporting across various network security protocols that can be used (IPSec, TLS, SSL, and SSH)

‒ AT-TLS currency: Updates to AT-TLS to support latest System SSL features
Networking

- **z/OS Communications Server**
  - IP security tunnel capacity increased
    - SYSPLEX wide limit of IP Security tunnels increased to 16,384
  - Improved network management
    - Wildcard support for job names on PORT/PORTRANGE statements
    - Long system symbol support for network configuration files
  - VTAM start option
    - Default VTAM internal trace options can now be disabled
**Security**

- **Policy enabled data encryption**
  - No application changes or awareness
  - Extended format BSAM / QSAM, VSAM, VSAM RLS, zFS are targets
  - Helps clients meet compliance mandates and requirements for data privacy
  - Controlled by DFSMS policy and/or SAF policy
  - Data remains encrypted during administrative functions such as backup/restore, migration/recall, and replication
  - zFS plans to support encryption of individual files, access control lists, security information and symbolic links

- **Coupling Facility Encryption**
  - Data transiting to and from the coupling facility will be encrypted
  - Data remains encrypted while it resides on the coupling facility
  - Structure level granularity
  - No application changes required

- **RACF field level access checking granularity**
  - Additional granularity for administrators that do not have RACF special attributes
  - Reduces need to grant administrator access
Security

- **Non-executable memory**
  - New option on IARV64 and storage obtain
  - Indicates that the memory contains data (not opcodes)

- **NJE security**
  - Ensuring that nodes are authenticated to reduce chance of spoofing
  - Health checks in place to ensure communication links are protected by TLS
  - Updates to both JES2 and JES3

- **FIPS standard compliance**
  - PKI services, ITDS Server, Network Authentication service (Kerberos), System SSL components attain compliance with NIST SP800

- **System SSL support**
  - RFC 6960 (OCSP) support for online certificate status protocol
  - RFC 6961 / RFC 6066 support for multiple certificate status request extension and TLS extensions
### Multi-Factor Authentication (MFA)
- Potential extensions to SAF to support additional authentication tokens
- Roll up of RACF service into v2.3 base

### SAF security deployment descriptor
- New callable service that allows an authorized application to express security attributes of users, groups, resources and their relationships
- Design of the service is intended to be security product agnostic
  - “CA Technologies is working together with IBM to design this new SAF based callable service to provide simplified security administration in an ESM neutral implementation. Provides the foundation for simplifying SAF security configuration for applications and products.”

### System SSL FIPS mode enforcement
- Run with a FIPS-compliant key length and cipher
Security

- **Network authentication services and Kerberos**
  - Remove need for UID(0)
  - FIPS Mode enforcement (similar to SSL’s)
- **PKI Services supports WAS Liberty**
  - Reduced footprint and simplified configuration
- **IBM Tivoli Directory server performance**
  - A new health check will suggest when DB2 REORG or RUNSTATS utilities should be run
- **RACF UID mapping**
  - RACF will extend the use of the USS PARMLIB BPXPRMxx keyword called SUPERUSER(xxxxxxx) to provide consistent UID=0 reporting
- **z/OS UNIX SMF service security**
  - In addition to BPX.SMF, a new Facility class BPX.SMF.xxx.yyy where xxx is the type and yyy is the sub-type will be supported
Application Development

- **Job completion notifications via e-mail**
  - Associate an e-mail address with a user ID in the security database
  - Use a new JCL statement to send information about job completion
    - `// NOTIFY EMAIL=sample@us.ibm.com,WHEN='RC!=0'`
    - Multiple notify statements are supported
  - Support e-mail as identifier on JOB card (in place of USER=)
    - Support is added to RACF to associate an e-mail address with a user profile
  - Allow pass phases as PASSWORD= on job cards

- **Web enablement toolkit**
  - Provide REXX language support for all JSON and HTTP toolkit services, in addition to C, Cobol, PL/I and Assembler
  - Allow application to send and receive very large data (request / response bodies) thru the use of staged (streamed) sends and receives
Application Development

- **z/OS UNIX support for year 2038**
  - z/OS needs to support IPLing after 2037.
  - Original UNIX date support runs out a bit after 0300 on 19 January 2038
  - We plan to double the z/OS UNIX time fields (from 32 bits to 64 bits) used to count seconds since 1 January 1972

- **LE SYSDUMP recording service**
  - Eliminate duplicate dumps when multiple interested parties are involved

- **ISPF**
  - Automatically generate extended statistics for a PDS member when needed

- **Enhancements to grep utility to support After, Before, Context**

- **XML System Services is enhanced to reduce split records**
Application Development

- **JES2 job group enhancements**
  - Job group level notification support
  - Job group level output descriptors
  - More flexible scheduling of job groups

- **JES2 JCL improvements**
  - The DLM keyword on SYSIN is extended from 2 characters to 18 characters
  - 2 new JCL symbols are added: current job name, current job number

- **z/OS Communications Server getaddrinfo**
  - Updates to comply with RFC2523 the Single Unix specification version 3

- **z/OSMF REST JOBS API**
  - Retrieve active step information with JES2
  - Support for job groups with JES2
GlassHouse Systems

Application Development

- **z/OS V2.3 XL C/C++ is planned to provide enhancements in the following areas:**
  - **Usability:**
    - Metal C is planned to create 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 planned to be provided for structure listings, the layout information can then be better compared and analyzed
    - DSECT utility is planned to create C structures/unions that align closer to the original assembler DSECT, to give the same size as the original DSECT
  - **Performance:**
    - Architecture default is planned to change to ARCH(10) (EC12) to align with the minimum hardware level that z/OS V2.3 is planned to support
  - **Security:**
    - Stack protection is planned to protect buffers that are susceptible to overflow and to stop returning from functions that detect overwriting
  - **Debugging:**
    - Metal C debug data blocks is planned to provide information linking the assembly or objects with the debugging data, providing synchronization of these files
    - Saved Option String Information (SOSINFO) utility is planned to emit options encoded in the PPA blocks, to help in diagnosing problems
    - DWARF debugging information in object files is planned to be added to the executable in an area that is not loaded at runtime, to allow access to both the debug data and executable code within the same file
February, 2017 – z/OS V2.3 will be the last release of z/OS to support the Server-Requester Programming Interface (SRPI). SRPI was introduced in TSO/E in the 1980s to provide a programming interface that enhances the environment of IBM workstations communicating with IBM mainframes running z/OS. Customers with applications using SRPI should start using TCP/IP for z/OS to provide similar function. Documentation for SRPI is available in TSO/E Guide to the Server-Requester Programming Interface, SA22-7785, and this publication as well as documentation for SRPI-related functions, such as the MVSSERV command, will be removed.

February, 2017 – 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 V2R2 Acrobat Indexed PDF Collection, SC27-8430, and the z/OS Base and Features KC4z plug-in collection, SK4T-9263. To provision KC4z, use Softcopy Librarian as you have done in the past for BookManager books and PDFs.

February, 2017 – Starting at z/OS V2.3 GA, IBM Knowledge Center will no longer contain z/OS V1R13 documentation plug-ins. You can continue to access and download z/OS V1R13 documentation in PDF format through the IBM Publications Center.
February, 2017 – This is a statement of direction to notify Infoprint Server clients of a planned change in default behavior in a future release. IBM intends to enable dynamic configuration as the default behavior. This change in default behavior will be mandatory and not reversible. You can disregard this statement if you already enabled dynamic configuration. See the Infoprint Server Customization publication (SA38-0691) for details on how to enable and the advantages of enabling dynamic configuration. Some advantages of enabling dynamic configuration include:

‒ Authorized administrators can use the Infoprint Server ISPF panels or the Printer Inventory Definition Utility (PIDU) to view and change the dynamic attributes rather than editing the /etc/Printsrv/aopd.conf file.
‒ If you change an attribute in the system configuration definition, with a few exceptions, you do not need to stop and restart Infoprint Server for the change to take effect.
‒ You can configure Infoprint Server to start and stop individual daemons.
‒ You can benefit from new functions in Infoprint Server that require dynamic configuration. For example, you can use the MVS system logger function.

February, 2017 – IBM intends to discontinue delivery of z/OS platform products and service on magnetic tape in the future. IBM recommends downloading products and service. However, if you have a requirement for physical media, products and service are also available on DVD.
February, 2017 – IBM intends to extend the ServerPac offering to provide the capability for it to support products packaged in ways that currently make them unavailable in ServerPac, including products that are not packaged using SMP/E. ServerPac will be designed to support packages with SMP/E-packaged products, non-SMP/E-packaged products, and a combination of both. This improvement will be intended to enable you to standardize your installation processes for the IBM products available for the z/OS platform. ServerPac will initially continue to use the existing ISPF-based CustomPac Dialog for installation. In this announcement, statements of direction appear for three new, related functions.

- The first will be designed to allow software product information to be added to a z/OSMF software instance that includes products that are not packaged with SMP/E so that information about software instances containing such products can be displayed. In addition, infrastructure is planned to be made available for providing end-of-service information for products that are not managed using SMP/E to complement the information already available for SMP/E-managed products for vendors who provide it.

- The second will be designed to enable you to download portable software instances from a remote server to a z/OS system, where they can be managed and installed by z/OSMF. This will be intended to simplify the process for acquiring portable software instances from software vendors who choose to provide products in this format.

- The third will be designed to support defining one or more z/OSMF workflows associated with a software instance, and executing those workflows during a z/OSMF Software Management deployment operation. In addition, this function will be designed to allow an Export action to include defined Workflows into portable software instances, and run during deployment for those software instances. This is intended to help you complete setup tasks for the products included in the software instance provided by a software vendor that provides the necessary supporting Workflows.
February, 2017 – Starting with IBM SDK for z/OS, Java Technology Edition, V8 SR17_03, support will be for z9 hardware and forward only.

February, 2017 – The release after z/OS V2.3 is planned to be the last release of the operating system to support the HFS (Hierarchical File System) data structure used by the z/OS UNIX environment. IBM has provided equivalent if not superior functionality with the z/OS File System (zFS). Customers should migrate from HFS to zFS using the utilities provided in the operating system to convert their entire file system hierarchy.

February, 2017 – Starting in z/OS V2.3, z/OS system logger will no longer support the log stream DRXRC duplex mode option.

October, 2016 – It was previously announced that z/OS V2.2 would be the last release to include a number of System Data Mover (SDM) TSO/E commands. Based on client feedback, IBM now intends to continue to support these commands in the future, including the query and XSET commands. However, IBM plans no future enhancements for them. IBM recommends you use the equivalent REXX versions of these commands instead, which are intended to be updated as needed to support any new functions in the future.
October, 2016 – In the future, IBM intends to provide a linkage between z/OSMF Software Management’s deployment function and z/OSMF workflows so a workflow can be initiated by a deployment operation. z/OSMF already supports one workflow calling another workflow. The new function will be designed to allow workflows to be used to manage installation-related and deployment related tasks by linking from package-level workflows to product-level and component-level workflows as needed to help you perform these activities both for initial installation (for example, on a test system) and later deployments to additional systems (such as application test, application development, and production systems). Also, IBM intends to extend the ServerPac offering to provide the capability for it to support products packaged in ways that currently make them unavailable in ServerPac, including products that are not packaged using SMP/E. ServerPac will be designed to support packages with SMP/E-packaged products, non-SMP/E-packaged products, and a combination of both. This improvement will be intended to enable you to standardize your installation processes for the IBM products available for the z/OS platform. ServerPac will initially continue to use the existing ISPF-based CustomPac Dialog for installation.

October, 2016 – IBM plans to deliver application transparent, policy-controlled dataset encryption in IBM z/OS. IBM DB2 for z/OS and IBM Information Management System (IMS) intend to exploit z/OS dataset encryption.
October, 2016 – IBM intends to support new capability in z/OS for metering and capping workloads over CPU and memory consumption. This capability will be delivered in stages with the initial focus on workloads that run only on specialty engines.

June, 2016 – z/OS 2.2 is the last release of z/OS that will include the Guest Platform Management Provider (GPMP) component in z/OS which provides data to the Ensemble management function of the Unified Resource Manager (aka zManager). Additional information on GPMP can be found at zEnterprise System Ensemble Workload Resource Group Management Guide.

June, 2016 – IBM z/OS V2.3 is planned to be the last release to include the Library Server element. IBM recommends that you use the Knowledge Center for z/OS that was introduced in z/OS V2.2 to create your own local repositories and manage their content.

December, 2015 – z/OS v2.3 is planned to be the last release to support the Batch Runtime component. The z/OS Batch Runtime component provides the framework for Java™ interoperation with COBOL and PLI, with transactional updates to IBM DB2® and Transactional VSAM. It is recommended that you use IBM WebSphere® Application Server JSR 352 instead.
September, 2015 – IBM intends to deliver a number of SDSF enhancements, including new commands that will be designed to display:

- Things to help you perform address space level diagnosis: active TCBs, CDEs, allocated data sets, and ENQ conflicts
- Virtual storage map and common storage utilization, including orphaned common storage
- Info about catalogs, mounted z/OS UNIX file system data sets, and SMF data sets
- ASID-related virtual storage information, including allocated storage by subpool
- Information about real, virtual, and auxiliary storage consumption by ASID
- Information about active subsystems, and identify a number of IBM subsystems such as DB2 and WebSphere MQ

- Additional SDSF displays will be intended to provide:
  - SMS-related information, including active classes and the volumes in storage groups
  - Parallel Sysplex information about XCF structures, groups, and members
  - WLM-related information, including service and reporting classes
  - Support for browsing virtual memory contents for an address space
  - Generic tracker information

- Finally, SDSF is planned to provide a new facility that will be designed to help you manage dynamic exits, which will be intended to make it easier to display active exits and to manage activation, deactivation, and replacement of system exits.
Previously announced SODs for z/OS 2.2 withdrawals

- As previously announced, the Simple Mail Transport Protocol Network Job Entry (SMTPD NJE) Mail Gateway and Sendmail mail transports are planned to be removed from z/OS. IBM now plans for z/OS V2.2 to be the last release to include these functions. If you use the SMTPD NJE Gateway to send mail, IBM recommends you use the existing CSSMTP SMTP NJE Mail Gateway instead. Also, IBM announced plans to provide a replacement program for the Sendmail client that would not require programming changes. Those plans have changed, and IBM now plans to provide a compatible subset of functions for Sendmail in the replacement program and to announce those functions in the future. Programming changes or alternative solutions to currently provided Sendmail functions might be required. No replacement function is planned in z/OS Communications Server to support using SMTPD or Sendmail as a (SMTP) server for receiving mail for delivery to local TSO/E or z/OS UNIX System Services user mailboxes, or for forwarding mail to other destinations.

- z/OS 2.2 is planned to be the last release to support the DFSMSrmm™ CIM Provider.

- z/OS 2.2 is planned to be the last release to include the Trivial File Transfer Protocol Daemon (TFTPD) function in z/OS Communications Server.
Previously announced SODs for z/OS 2.2 withdrawals

- z/OS 2.2 is planned to be the last release to provide support in the Common Information Model (CIM) component for the Java Managed Provider Interface (JMPI).
- z/OS 2.2 is planned to be the last release to support:
  - The HCD LDAP backend for use with the IBM Tivoli Directory Server for z/OS (LDAP)
  - The DRXRC log stream option for system logger. IBM recommends you use other available mirroring options with IBM z/OS Global Mirror (zGM), also known as Extended Remote Copy (XRC), or GDPS instead.
- z/OS 2.2 is planned to be the last release to include the TCP/IP legacy device drivers for FDDI and Token Ring (LCS with LINKs FDDI and IBMTR), Token Ring (MPCIPA with LINK IPAQTR), and ENet and FDDI (MPCOSA with LINKs OSAENET and OSAFDDI). If you are using any of these devices, IBM recommends you migrate to newer devices such as OSA Express QDIO and HiperSockets. Note that this withdrawal is only for TCP/IP device types, and not to for any of the SNA device drivers.
- z/OS 2.2 is planned to be the last release to include the RMF XP support for Microsoft Windows Server.
Complete – IBM plans to remove support for unsecured FTP connections used for z/OS software and service delivery 1Q2016. For z/OS software (products and service) direct-to-host downloads will require the use of FTSP or HTTPS. Use the Connectivity Test website to verify your system setup well in advance. Note: No change is required to use Download Director with encryption to download packages to a workstation and transfer them to z/OS later; however, you can also verify Download Director with the Connectivity Test.

Complete – IBM plans extend the Configuration Assistant for z/OS to support making dynamic configuration changes to an active TCP/IP configuration, and to import existing TCP/IP profile data.

Superseded – z/OS 2.2 is planned to be the last release to include a number of TSO/E-based System Data Mover (SDM) related commands. Except for the query commands (CQUERY, FCQUERY, RQUERY, XQUERY, XSTATUS), and the XSET command, which will remain, IBM recommends you use the REXX version of these commands instead. For more information about using the REXX commands, see z/OS DFSMS Advanced Copy Services.
Thanks!

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