IBM® Power® Platform Evaluation Test Stack Summary June 2015: PSTACK_2.2.1.4a and PSTACK_2.2.3.3a

NOTE: This document is provided by IBM “as is”, without any warranties or conditions (express or implied) whatsoever, including but not limited to any implied warranties or conditions of merchantability or fitness for any particular purpose. The technical information contained in this document is under continued development and is subject to change without notice. It documents an operational hardware and software testing environment intended to simulate possible end user IT environments but is not an actual IT environment used to run a business. Any technical information contained in this document is not provided as an explicit or implicit recommendation from IBM. IBM will not be liable for any consequential damages, lost profits, lost savings, loss of anticipated revenue, or any exemplary, punitive, special or indirect damages that may result from use of any technical information contained in this document.

Contents

Introduction

As an ongoing relationship that benefits both IBM and customers, the IBM Power Platform Evaluation Test laboratory maintains a hardware and software environment to model the IBM components and subsystems that customers use in their IT infrastructure. The goals of documenting this environment and testing are:

1. Configure and maintain over time a representative hardware environment that includes relevant IBM Power server hardware, IBM Storage hardware, coupled by standard SAN and Ethernet hardware. The hardware is configured how a customer would implement it, using virtualization by way of PowerVM® to provide a cloud infrastructure which can leverage advanced enterprise concurrent maintenance technologies (e.g. Live Partition Mobility or LPM).
2. Configure and maintain over time a representative software environment that includes AIX® and relevant middleware and management (DB2®, WebSphere®, MQSeries®, Tivoli®) applications. The software is configured how a customer would implement it.
3. Configure relevant advanced availability mechanisms (adapter redundancy, dual fabric SAN) the way a customer would implement it, leveraging an enterprise storage backend with IBM XIV® and DS8000® storage.
4. Run a customer-like application on the hardware/software infrastructure that can be monitored for throughput and transactional latency, so that failure modes can be identified.
5. Operate the infrastructure such that typical customer operations are exercised with an emphasis on enterprise functions like High Availability and Live Partition Mobility (LPM), especially during migrations.
6. Inject hardware and software errors to characterize degraded conditions and verify that the system as a whole stays operational.
7. Document the software stack used and issues encountered over time.

In summary, this testing configuration and stack is intended to represent a realistic configuration of the IBM hardware and software components for an infrastructure stack to support a virtual POWER AIX cloud. A customer-like application utilizing WebSphere Application Server, MQSeries, DB2, and POWERHA is used to apply and measure transactional loading so this environment can always be running as testing, operations, and migrations occur. Finally, transactions generated from this application server (or grouping of like application servers) can be used to stress/test back-end database servers.

Hardware system under test

The following diagram (Figure 1) details the testing environment used for this work, showing redundant server, network, and storage infrastructure used.

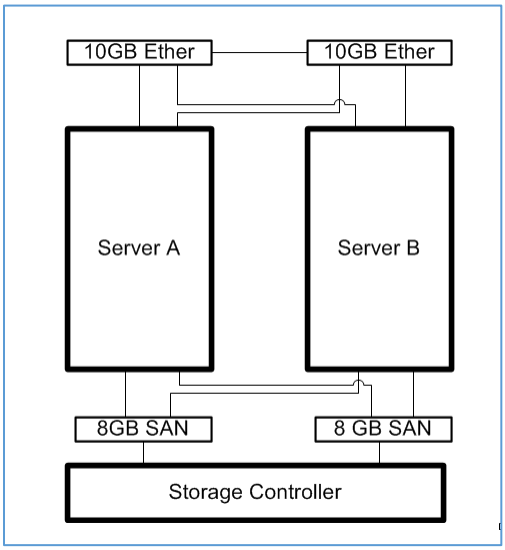

Figure 1: Redundant Server, Network, and SAN/Storage Environment for test

Note that Servers are titled “Server A”, Server B” etc. The code levels shown in later sections of the document are for different machine types (e.g. Power7 9117-MMB, etc.).

Figure 2 shows the internal virtualization infrastructure of each server. NOTE: virtual SAN (FC/VFC) and virtual Ethernet counts are larger – this picture is to illustrate the redundancy and virtualization configuration.

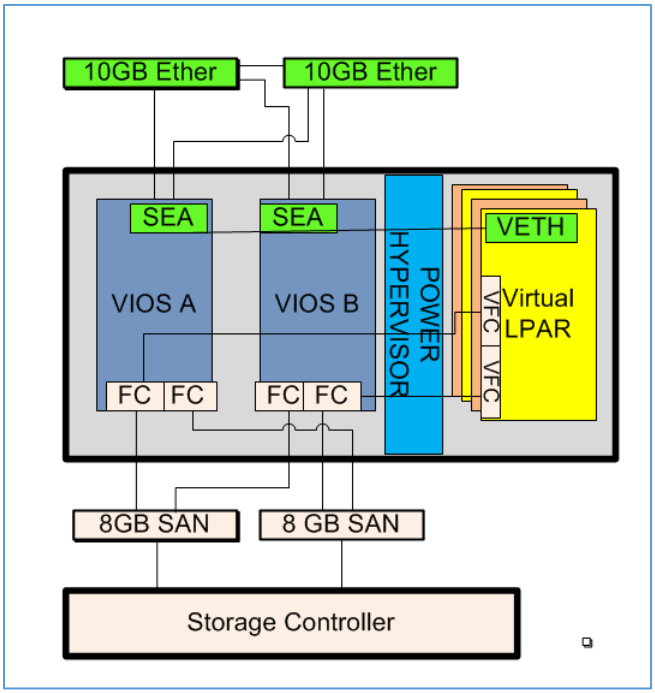

Figure 2 Server Internal Virtualization Configuration.

In the figure, Virtual I/O Server (VIOS) A and VIOS B will be at certain VIOS (PSTACK) code levels specified. Virtual Logical Partition (LPAR) will be at certain AIX code levels specified as co-existent with that PSTACK level. Adapters implied on the VIOS will be at code levels also in the PSTACK level. Also note these important points about the infrastructure:

1. The system under test is comprised of multiple BookStore WebSphere Application Server (BSWAS) lpars, at various AIX levels. These lpars contain is an application stack used to drive transactions to back-end BookStore BUY (BSBUY) test lpars.
2. All storage is on IBM XIV and DS8000 Storage.
3. All LAN Networking is on Redundant Cisco Nexus® 5548 switches in a Layer 2 VPC config.
4. AIX Native Multiple Path I/O (MPIO) is used on all lpars for storage/SAN multi-pathing control.
5. Dual Fabric SAN (a minimum of two connections from lpar to storage through two unique SAN switches) is used on every lpar.
6. VIOS hdisks (storage) are local to the Server (not on SAN), and are mirrored using AIX LVM mirroring.

Software system under test

The following diagram (Figure 3) details the software testing environment used for this work.

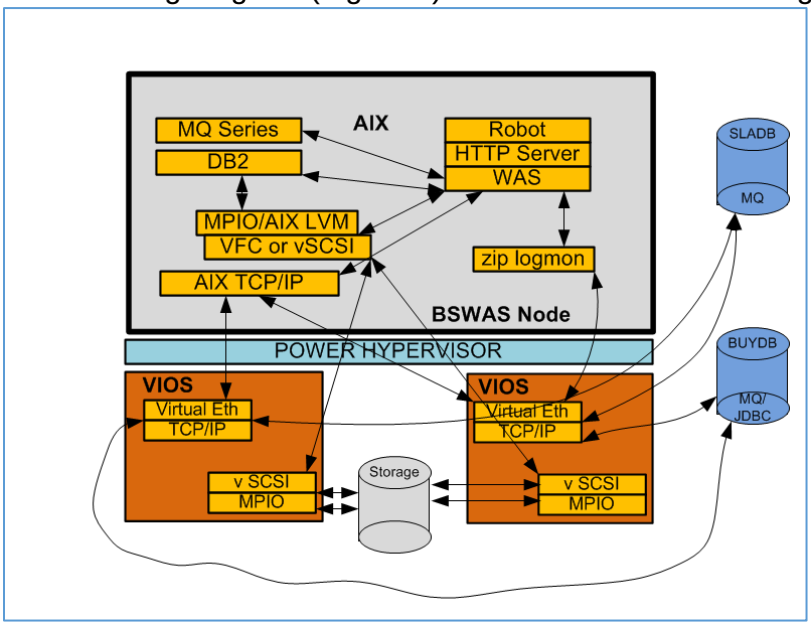

Figure 3: Bookstore WAS (BSWAS) Detail

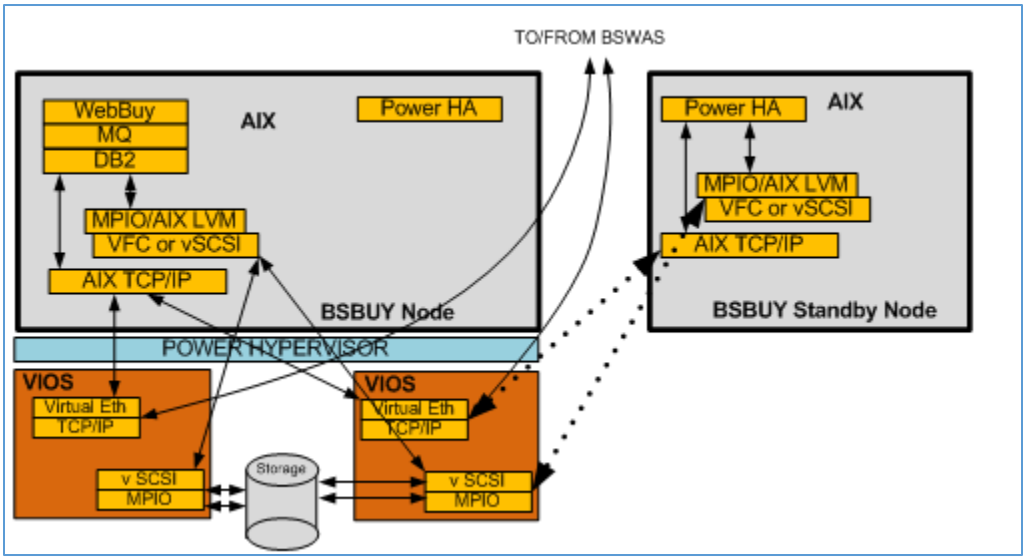

Figure 4 Bookstore BUY (BSBUY) Detail

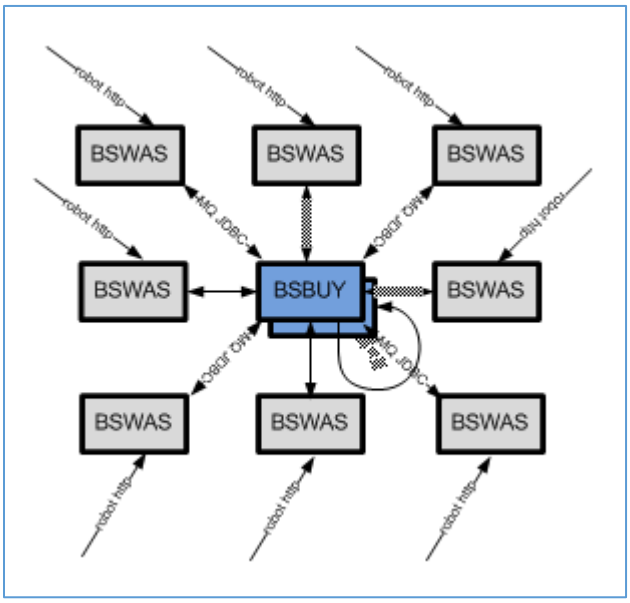

Figure 5: Typical BSWAS - BSWAS configuration. NOTE: Each box is a virtual lpar

Note the following details on the software configuration:

1. This application server is the front-end (web, application server) of a test application called the Bookstore, modelled after an online bookstore.
2. For the DB2 database, there is 1 DB2 instance, which contains the catalog of all the books/pricing data in the bookstore. DB2 tuning and AIO settings are per DB2 documentation. Total DB size is approximately 30 GB. Database log size is 256K, 30 logs, and logging is circular.
3. 4 processors and 8 GB of memory is a typical allocation for the Bookstore WebSphere Application Server (BSWAS).
4. Filesystems are all jfs2.
5. Workload is applied via the automated “robot” that drives the web interface – the typical transaction is random and involves “browsing” to local DB2 via JDBC for a random book/author, filling up a shopping cart, and purchasing the book (the latter purchase is a JDBC or MQ Series transaction to the back end “buy” database.
6. The ziplogmon process tracks summary of aggregate transaction performance (latency, throughputs) and this information is forwarded to another DB2 Data Base (SLA) for future reference.

Code Level Information

The following pages describe code levels that have been successfully used in this infrastructure.

Key points about the stack level descriptions:

- The VIOS levels 2.2.3.3 and 2.2.3.52 are the VIOS code levels. The “j” and “i” designations denote the stack iterations including VIOS interim fixes listed, and later HMC and Server Firmware levels that have been validated with the stack.
- The Top bar denotes Hardware Management Console (HMC) levels that can be used with the stack. NOTE: This HMC level must be at a level at or above the minimum supported Server (CEC) Firmware level. Recommended levels are in green, and older levels are yellow.
- The Bar along the side denotes Server (CEC) Firmware that can be used with the stack. NOTE: The Server Firmware level must be at a level at minimum support for the HMC level or below. Recommended levels are in green, and older levels are yellow.
- The VIOS levels (and interim fixes) listed are the anchor points for the stack and listed in the center table.
- AIX levels exercised with this stack are listed. AIX levels listed in red have been exercised but we do not recommend them because they are technically not supported or out of support.
- Footnotes provide additional information on a per-stack basis. There is one stack per machine type due to the server microcode.
- Adapter types, feature codes, and adapter microcode levels are also listed in the bottommost table for each stack.
- A brief testing summary is also listed after the stack, with highlights and any relevant workarounds or issues.

Why FLRT was not used for these code levels?

IBM always recommend that you use FLRT, or the Fix Level Recommendation Tool, available here:

https://www-304.ibm.com/support/customercare/flrt/

or FLRT Lite:

https://www-304.ibm.com/webapp/set2/flrt/liteHome

We recognize that not all customers are at the latest code levels, and do not necessarily want to try the latest code levels (usually) recommended by FLRT. Most of the defect knowledge generated by the Power Platform Evaluation Test lab is incorporated into FLRT, but our intent is to follow a more conservative course often followed by enterprise customers – to provide another set of data and options for code stacks. This stack report is also a complete code stack top to bottom, so if you have a match with the hardware and environment this might be a better fit.

We recommend when choosing your code levels, to consult FLRT or FLRT Lite first, as some of this information may be a month old, so there may be some new content in FLRT.

Migration Method

These levels of code were not migrated to. They were used for initial install, PSTACK_2.2.1.4 on 9117-MMB and 9117-MMC systems and PSTACK_2.2.3.3 on the 9117-MMD systems.

PSTACK_2.2.1.4a and PSTACK_2.2.3.3a Details

VIOS level (9117 - MMB and 9117 - MMC) ***NOTE: used in PSTACK_2.2.1.4a ONLY***	2.2.1.4 + interim fix list below IV43556s4a DRC name Timeout issue fix 65740_HEA Fix for HEA hang in close 65740_shut Fix for shutdown after reboot -p 65740_SEA1 Fix for SEA issues IV53296m4a Cleanup issues in config performance IV56015m4b Various LPM/viosbr Fixes IV40640m4a Elxentdd multi-fix 65740_CT3 Fix for CT3 adapter issues IV60966s4a Fix for timing hole in FC DD
VIOS level (9117 – MMD) ***NOTE: used in PSTACK_2.2.3.3a ONLY***	2.2.3.3 + interim fix list below IV56366m3d - cumulative VIOS 2.2.3.3 interim fixes IV62188s3a – Fix for SEA Logging IV68428m3a – NTP Security IV68712s03 – EEH Error improvements
MMB (9117-MMB) FW	730_116, 780_068, 780_075
MMC (9117-MMC) FW	740_112, 770_092, 770_098
MMD (9117-MMD) FW	780_068, 780_075
HMC Levels	~~7.7.4 SP3 + MH1390 or 01412 <-not recommended~~ 7.7.9 + SP2 8.2.0 + SP2 8.3.0 + SP1
LPR0 (Network Installation Management Server) Levels	AIX 6.1.8.2 AIX 7.1.2.2, 7.1.3.3
AIX Clients Supported	AIX 6.1.6.6, 6.1.7.4, 6.1.8.2, 6.1.9.2 AIX 7.1.2.2, 7.1.3.2

Table 1: PSTACK2.2.1.4a and PSTACK_2.2.3.3a levels

PSTACK_2.2.1.4a and PSTACK 2.2.3.3a Test Summary

Test Macro	Description	Success Criteria	Pass / Fail
INSTALL	Install new stack	VIOS and clients error clean	PASS
OP	Baseline/peak running of app	No deviations, errors	PASS
RED	Redundancy tests (VIOS/LAN/SAN)	24 hr. min, no unexpects	PASS
PATCH	Apply any ifixes	1x, no errors	PASS
LPM	LPM confidence / soak testing	100 loops x4 or 8, multiple	PASS

Table 2. Test plan summary.

Test Spotlight:

- Several additional VIOS ifixes were discovered and applied as part of the test process.

Trademarks

The following terms are trademarks of the International Business Machines Corporation in the United States, other countries or both:

IBM®
AIX®
DB2®
DS8000®
FlashCopy®
IBM®
Power®
Power Systems™
PowerHA®
POWER6®
POWER7®
POWER8®
PowerVC™
MQSeries®
Tivoli®
WebSphere®

The following terms are trademarks of other companies:
Brocade®, Brocade FabricOS®, DCX™
Cisco®, Cisco Nexus®
Java and all Java-based trademarks are trademarks of Oracle and/or its affiliates in the United States, other countries, or both.
UNIX is a registered trademark of The Open Group in the United States and other countries.