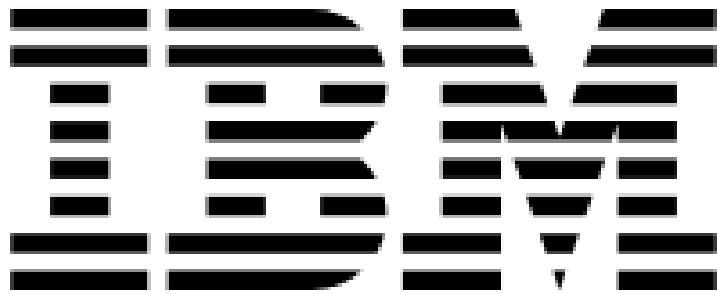


Optimizing the Value of Hybrid Clouds with zLOV

The Ongoing Results of a Partnership between IBM's COE, WSC and Velocity Software Inc. (VSI)



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Center of Excellence (COE)
Washington System Center (WSC)

“If you can’t Measure it,
I am Just Not Interested™”

Barton Robinson’s quote that Velocity Software lives by



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PROVEN PERFORMANCE

Optimizing the Value of Hybrid Clouds with zLOV

- **Optimizing workloads allows you to run more using less resources.**
- **Optimized workloads simplify managing operations with SLA's.**
- **Visualization with the right real time tools allows you to act quickly.**
- **Our agenda is to review why we started this partnership, what has been accomplished to date, and then continue to bring everyone along our journey optimizing workloads on IBM Z and LinuxONE systems.**

Why IBM and VSI Partnered For This Project

- **Customer requested help!**
- **And why do customers request Velocity Software's assistance?**
 - **VSI works with, and are considered a trusted partner with our customers.**
 - **VSI simplifies and automates workload optimization on IBM Z and LinuxONE.**
 - **VSI is extremely light weight (very low resource consumption, less than 0.1% of a processor with no additional RHEL or other OS, JAVA or Database licenses required).**
 - **This really helps customers meet their consolidation with sustainability and TCO goals!**
 - **In this case, many customers use our tools already and know we work with IBM.**
 - **Plus, we have been able to deliver the custom dashboards required by their businesses.**
- **Why work with IBM's COE and WSC?**
 - **They have the environments.**
 - **They have all the required skills.**
 - **They have a keen interest in continued success of IBM Z and LinuxONE too.**

Current Scope and Focus - 2 Main Parts for MongoDB

- **Provide Platform Visualization**

- Today at most shops, MongoDB DBA's have no visualization into LinuxONE, and the Virtual Machines (VM) running on them.
- Velocity worked directly with MongoDB and prior to version 6 supported direct reporting through our interfaces. The removal of SNMP at v6 broke that support.
- Velocity has created a new MIB that gathers and reports MongoDB stats by querying the databases directly.
- This allows real time MongoDB stats to be shared via Grafana, in addition to being available from within Velocity's products where actions can be automated with them as well.

- **Optimize MongoDB**

- Many MongoDB deployments are looking to maximize LinuxONE's consolidation with sustainability goals.
- The proper number of vCPU's can be controlled through Velocity's Resource Manager (zVRM).
 - Too many vCPU's causes excessive waits and slows overall processing.
- Free memory can be managed by zVRM, but might not be aggressive enough.
- Testing MongoDB with zVRM has started. The teams first focus is providing visualization into the systems!

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Current LinuxONE Systems used for this Project

LinuxONE Rockhopper 3932-LA2(A00) used with z/VM:

- 68 IFLs, 16,224 GB RAIM storage
- 10x FICON-FCP FICON Express 32S
- LPAR: 01/NORMA01 (z/VM 7.3.0)
- 16 Shared IFLs, 228 GB Storage, 2x OSD OSA Express7S 25G

LinuxONE Emperor 3931-LA1(400) used in LPAR mode:

- 39 IFLs, 2,816 GB RAIM storage
- 6x FICON-FCP FICON Express 32S
- MongoDB LPAR: 06/OBMLPAR2 (RHEL 8.10, 8 IFLs, 8 GB Storage)
- OracleBM-LPAR1 (RHEL 8.10, 20 IFLs, 256 GB Storage)



Provisioning the Environment: z/VM Installation and Configuration

- **z/VM 7.3 installed using IBM's Express System Install (ESI) process**
- **Deployment targeted at LinuxONE Rockhopper system under LPAR NORMA01**
- **DPM (Dynamic Partition Manager) used to streamline hardware management and provisioning of storage**
- **Ensured the system and guests had enough resources to support Linux guests for MongoDB benchmarking**



Guest Creation For Environment

- **Created directory entries for each Linux guest needed for MongoDB workloads**
- **Linux Guest used for MongoDB, Grafana, InfluxDB and Prometheus.**
 - Containers were also looked at, but did not match customers system.
 - Future goal is to measure performance difference between the two.
- **Coordination with storage team ensured FCP devices were accessible for Linux installs**



Prometheus, Grafana, and InfluxDB on Linux Guests

- **Dedicated Linux guests were provisioned to run open-source visualization tools**
- **InfluxDB configured as the time-series database to store performance data for Grafana**
- **DataPump & VSIPUMP used to collect and push z/VM CP monitor and MongoDB data into InfluxDB**
- **Imported z/VM dashboards to monitor system performance from Grafana**



Operational Tasks and z/VM Administration

- Collaborated with Paul Novak to drive day to day z/VM system administration
- Installed Velocity Software zLOV stack, and upgraded components as required for new MongoDB stats
- Pulled performance data from z/VM using VMARC format for efficient transfer
- Packed and uploaded VMARC files to Velocity's site for analysis
- Validated data and ensured timestamps aligned with benchmark intervals



Linux reporting from Velocity



zVIEW - Velocity Software (WSCVML01)
Performance Displays for z/VM, Linux, z/OS and z/VSE

ESALNXP - VSI Linux Percent Usage by Process - WSCVML01																																
Time	Node	Name	Process Ident			CPU Percents				nice prty		Storage Metrics (MB)							Faults/Second				Char I/O/Sec		Process		Owner	Group				
			ID	PPID	GRP	Tot	sys	user	syst	usr	valu	valu	Size	RSS	Peak	Swap	Data	Stk	EXEC	Lib	Lck	PTbl	min	maj	mint	maj			Read	Write	User	Process
15:18:00	mongodb1	*Totals*	0	0	0	1.1	0.3	0.8	0	0	0	0	9749	672	10K	55.3	1619	7.1	226	603	404	6.3	4	0	3	0	84103	33968				
15:18:00	mongodb1	snmpd	2133	1	2133	0.1	0.1	0.0	0	0	-10	10	35.3	10.8	50.4	11.7	18.2	0.1	0.0	16.1	0	0.1	0	0	0	0	33644	0	root	root	root	root
15:18:00	mongodb1	mongodb-mms-	2191	2180	2180	0.1	0.0	0.1	0	0	0	20	2928	80.6	2928	1.1	296	0.1	58.9	6.4	0	0.5	0	0	3	0	7722	913	mongod	mongod	mongod	mongod
15:18:00	mongodb1	pmdalinux	2444	2439	2435	0.1	0.0	0.0	0	0	0	20	16.2	5.8	16.3	0.8	1.1	0.3	0.2	13.9	0	0.1	0	0	0	6119	3906	root	root	root	root	
15:18:00	mongodb1	mongod	1501830	1	0	0.7	0.2	0.6	0	0	0	20	1097	265	1097	0	929	0.1	151	13.1	0.0	1.0	0	0	0	18296	17908	mongod	mongod	mongod	mongod	
15:18:00	ATSWRK02	*Totals*	0	0	0	0.2	0.1	0.1	0.0	0.0	0	0	8884	1196	9469	0	1332	9.8	79.0	837	412	7.1	37	0	28	0	0	0	0	0	0	0
15:18:00	ATSWRK02	multipathd	3253	1	3253	0.0	0.0	0	0	0	0	-100	412	28.7	476	0	21.0	0.1	0.1	7.8	412	0.1	0	0	0	0	0	0	root	root	root	root
15:18:00	ATSWRK02	cron	5708	1	5708	0.0	0	0	0.0	0.0	0	20	6.5	2.7	6.5	0	0.3	0.1	0.1	3.1	0	0.1	0	0	28	0	0	0	root	root	root	root
15:18:00	ATSWRK02	snmpd	5712	1	5712	0.1	0.1	0.0	0	0	-10	10	23.0	13.1	23.1	0	4.7	0.1	0.0	14.7	0	0.1	0	0	0	0	0	0	Debian-snm	Debian-snm	Debian-snm	Debian-snm
15:18:00	ATSWRK02	kworker/5:2-	201685	2	0	0.0	0.0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	root	root	root	root
15:18:00	ATSWRK02	boinc	3563604	1	0	0.1	0.0	0.0	0	0	10	30	110	17.1	173	0	18.8	0.1	0.9	25.6	0	0.2	0	0	0	0	0	0	boinc	boinc	boinc	boinc
15:18:00	LXNR0102	*Totals*	0	0	0	1.0	0.3	0.7	0	0	0	0	4861	505	6819	10.5	1359	4.1	164	313	413	4.1	0	0	0	0	85659	20264				
15:18:00	LXNR0102	kworker/6:1H	242	2	0	0.0	0.0	0	0	0	-20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	root	root	root	root
15:18:00	LXNR0102	multipathd	8088	1	8088	0.4	0.2	0.2	0	0	0	20	413	29.1	477	0	20.4	0.1	0.1	8.9	413	0.1	0	0	0	0	691	0	root	root	root	root
15:18:00	LXNR0102	tuned	9423	1	9423	0.0	0	0.0	0	0	0	20	258	17.7	258	9.3	40.3	0.1	0.0	24.9	0	0.2	0	0	0	0	0	0	root	root	root	root
15:18:00	LXNR0102	snmpd	1146090	1	0	0.1	0.0	0.0	0	0	-10	10	23.8	13.0	23.8	0	6.7	0.1	0.0	16.1	0	0.1	0	0	0	0	38910	0	root	root	root	root
15:18:00	LXNR0102	mongod	2108783	1	0	0.5	0.1	0.4	0	0	0	20	1280	297	2804	0	1112	0.1	151	13.1	0.0	1.4	0	0	0	0	46019	20262	mongod	mongod	mongod	mongod
15:18:00	LXNR0103	*Totals*	0	0	0	0.7	0.2	0.5	0	0	0	0	4702	516	5132	0	1199	4.1	164	313	409	3.7	0	0	0	0	68369	20230				
15:18:00	LXNR0103	mongod	2461	1	2461	0.4	0.1	0.4	0	0	0	20	1126	277	1127	0	958	0.1	151	13.1	0.0	1.0	0	0	0	0	34033	20228	mongod	mongod	mongod	mongod
15:18:00	LXNR0103	multipathd	5117	1	5117	0.1	0.1	0.1	0	0	0	20	409	25.4	473	0	16.7	0.1	0.1	8.9	409	0.1	0	0	0	0	423	0	root	root	root	root
15:18:00	LXNR0103	snmpd	390440	1	0	0.0	0.0	0.0	0	0	-10	10	23.2	14.3	23.4	0	6.1	0.1	0.0	16.1	0	0.1	0	0	0	0	33893	0	root	root	root	root
15:18:00	LXOCPB01	*Totals*	0	0	0	0.6	0.0	0.1	0.3	0.2	0	0	13K	528	13K	0	2688	8.1	113	677	0	7.8	0	0	2377	0	95246	5789				
15:18:00	LXOCPB01	snmpd	221589	1	0	0.0	0.0	0.0	0	0	-10	10	44.9	30.5	57.2	0	27.8	0.1	0.0	16.1	0	0.1	0	0	0	0	19276	0	root	root	root	root
15:18:00	LXOCPB01	influxd	910327	910317	1000	0.0	0	0.0	0	0	0	20	2509	144	2523	0	402	0.1	15.3	1.9	0	0.9	0	0	0	0	539	2720	support	support	support	support
15:18:00	LXOCPB01	crond	3050713	1	0	0.5	0	0	0.3	0.2	0	20	6.9	2.0	6.9	0	0.8	0.5	0.1	2.5	0	0.1	0	0	2377	0	75301	3051	root	root	root	root



MongoDB Stats from Linux on z/VM

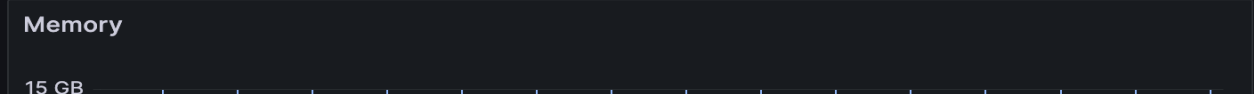
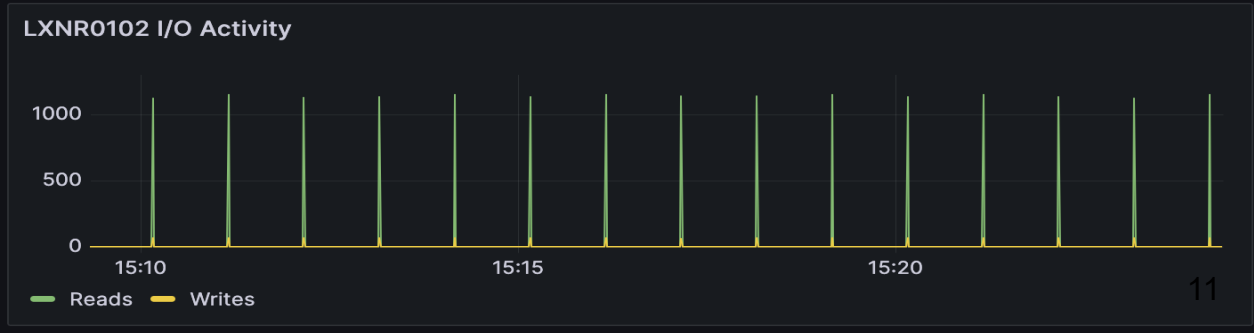
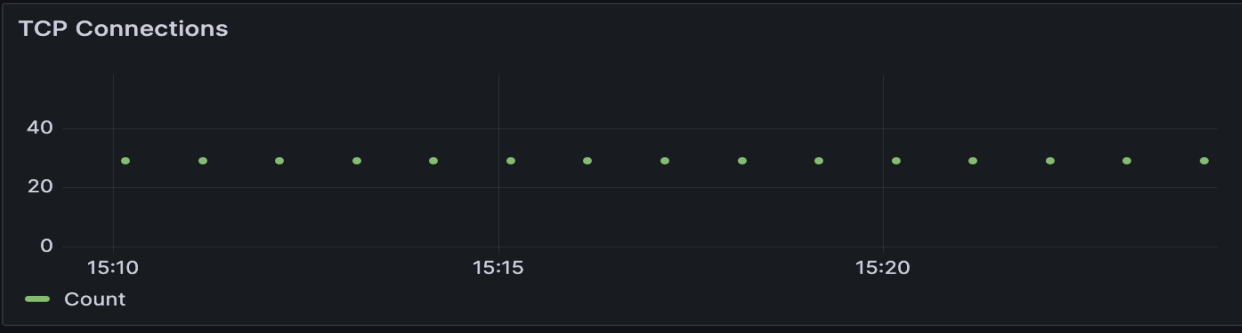
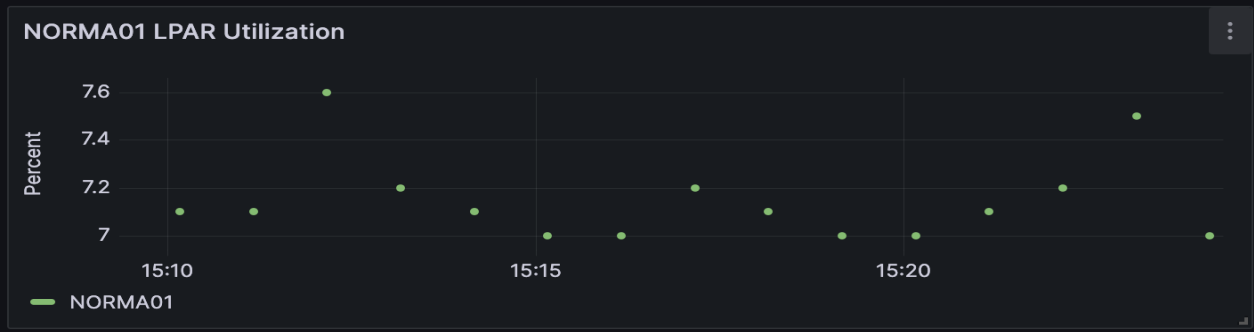
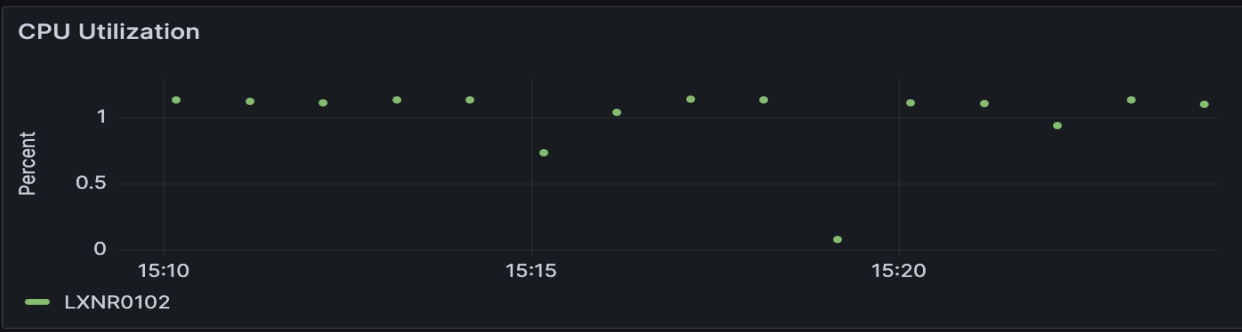
Search or jump to... cmd+k

Home > Dashboards > Mongo Server Activity

Last 15 minutes 1m

Node LXNR0102

Current CPU Utilization 1.10	Current I/O Reads: 1152 Writes: 68	Current Network Activity In: 10.6 Out: 9.43	Users 1	Processes 297	TCP Connections 29
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Introducing Data From Velocity's New MongoDB MIB

- As you can hopefully see, this is hot off the press
- It is still in test, but has been packed for testing with IBM
- And the team is learning a lot about MongoDB stats!

```
Screen: ESAMNG2 Velocity Software - VSIVM2      ESAMON 5.141 06/12 22:13-22:14
MongoDB Processing                             NODE MONG08*      8562 020F78
```

Time	Node	Host Name	Threads	Network (Bytes/s)		<-Disk (Bytes/s)>		<Cache (Bytes)>		<Wired Read	Tiger Cache (Pages)			<-----Connections----->				
				In	Out	In	Out	Used	Max		RdCkpt	Written	Dirty	Open	Actv	Rejct	Avail	Total
22:14:00	mongo8pr	mongo8pr	93	2726	5232	469402	55772864	6426530	1078M	1406	134	2650	149	13	0	0	51187	32478
	mongo8s1	mongo8s1	197	357311	1425509	194628	678639	8136235	1078M	564	52	2110	274	120	1	0	51080	99092
	mongo804	mongo804	84	2105082	777382	50517	6436386	27494K	1078M	121	0	13702	85	42	1	0	51158	278146

Initial Samples from Direct MongoDB Queries

- **Host=mongo804.velocitysoftware.com Version=8.0.4 pid=943**
- **Asserts: Regular=0, Warning=0, Msg=0, User=79627, Tripwire=0, Rollovers=0**
- **Connections: Current=6, Available=51194, Created=39854, Rejected=0, Active=2**
- **Operations: Insert=1023, Query=0, Update=0, Delete=8907392,**
- **Getmore=1023, Command=8907176**
- **OperationsRepl: Insert=1023, Query=2607904, Update=1023,**
- **Delete=13744208, Getmore=682, Command=1023**
- **Network: bytesin=1023 bytesout=6383516**
- **Memory: Resident=2612200, Virtual=1023**

Driving Benchmarks for Testing

MongoDB Benchmark and Yahoo YCSB are being used.

- **50/50 read and write testing was mainly used as this closely mimics our target customer's workload.**
- **90/10 read and write testing was used for variations.**
- **Once MongoDB visualization and optimization phase is behind us, we plan to show the results of using compression from LinuxONE.**
- **Adding power usage and AI offload metrics are also being looked into.**



Still Pending x86 and a LinuxONE 5

- A VMware based environment is set up at the COE.
- This will be used for some upcoming Oracle and MongoDB benchmarking test.
- And IBM's COE has a new LinuxONE 5 being set up so we can see the increased value behind the latest generation of these systems.



VMware Environment

- **See David Simpson and Justice Heughan's Customer Experiences Running Data Bases with z/VM session in Alumni at 15:30 today!**

The Team

From Velocity Software Inc (VSI):

Barton Robinson
CTO and founder of VSI

Rich Smrcina
Lead zLOV & Grafana Specialist

Kevin Vincent
Lead MIB Specialist

Kurt Acker
zLOV Architect



Center of Excellence (COE)
Washington System Center (WSC)

From IBM:

Ernest Horn WW LinuxONE
Client Success Manager at the COE

Tony Avdiu
CPO Team Lead

David Simpson and Sam Amsavelu
Oracle and MongoDB on Z specialist at IBM

Scott Ratzloff
WSC Z Specialist

Justice Heughan
WSC z Specialist

Paul Novak
Cloud and Virtualization SME

Velocity Software's zLOV Suite

zVPS

PERFORMANCE SUITE

THE WORLD'S LEADING PERFORMANCE MANAGEMENT SOLUTION FOR Z/VM WITH LINUX AND/OR VSE. NEWLY ADDED SUPPORT FOR Z/OS PLUS NO-CHARGE MONITORING FOR X86 LINUX AND WINDOWS.



zPRO

CLOUD MANAGEMENT

SOLUTION FOR MODERNIZING THE Z/VM PLATFORM, ADDING ON-PREM CLOUD SUPPORT WITH WEB-BASED CONTROLS FOR Z/VM SYSTEM MANAGEMENT PLUS LPAR CLONING AND ANSIBLE PLAYBOOKS USING VELOCITY'S HIGHLY AVAILABLE SMAPI-FREE API'S.



zTUNE

SUPPORT SUBSCRIPTION

VELOCITY SOFTWARE'S ELITE PERFORMANCE SUPPORT SERVICE THAT CREATES AUTOMATED DAILY REPORTS WITH RECOMMENDED ACTIONS



zVRM

RESOURCE MANAGER

REAL-TIME MANAGEMENT FACILITY FOR Z/VM WITH LINUX THAT AUTOMATES SYSTEM SETTINGS USING KNOWLEDGE-BASED INTELLIGENCE TO TUNE WORKLOAD REQUIREMENTS AND OPTIMIZE OVERALL SYSTEM PERFORMANCE.



Questions?

Contact Velocity Software anytime

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