

Performance Factors in Cloud Computing Share Session 12778



Laura Knapp WW Business Consultant Laurak@aesclever.com



Background

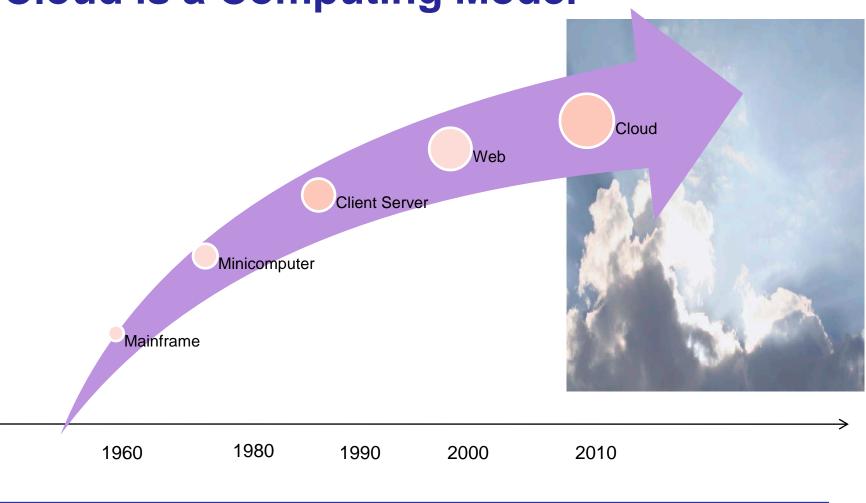
Performance Challenges

Maintaining Mainframe Network Performance in a Cloud





Cloud is a Computing Model



© Applied Expert Systems, Inc. 2013



Why Cloud

BENEFIT	COMMENT
Cost Savings	Organizations can reduce or eliminate IT capital expenditures and reduce ongoing operating expenditures by paying only for the services they use and, potentially, by reducing the size of their IT staffs.
Flexibility	Cloud computing offers more flexibility (often called "elasticity") in matching IT resources to business functions than past computing methods.
Scalability	Organizations using cloud computing need not scramble to secure additional hardware and software when user loads increase, but can instead add and subtract capacity as the network load dictates.
Access to Top-End IT Capabilities	Particularly for smaller organizations, cloud computing can allow access to hardware, software, and IT staff of a caliber far beyond that which they can attract and/or afford for themselves.
Redeployment of IT Staff	By reducing or doing away with constant server updates and other computing issues, and eliminating expenditures of time and money on application development, organizations may be able to concentrate at least some of their IT staff on higher-value tasks.
Focusing on Core Competencies	Arguably, the ability to run data centers and to develop and manage software applications is not necessarily a core competency of most organizations.
Sustainability	The poor energy efficiency of most existing data centers, due to substandard design or inefficient asset utilization, is now understood to be environmentally and economically unsustainable.



Cloud Types

PRIVATE CLOUD

Operated solely for an organization

COMMUNITY CLOUD

Shared by several organizations and supports a specific community that has shared concerns

PUBLIC CLOUD

Made available to the general public or a large industry group and is owned by an organization selling cloud services

HYBRID CLOUD

Composition of two or more clouds (private, community, or public) that remain unique entities but are bound together

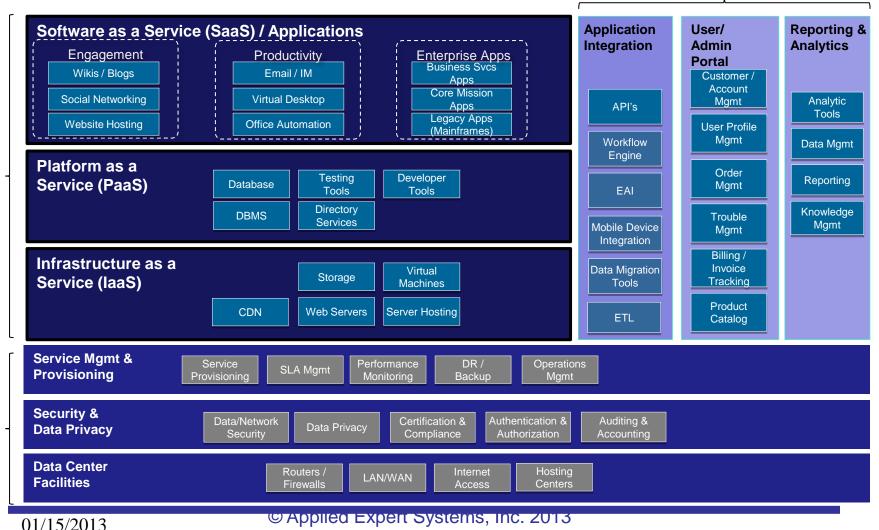
01/15/2013

© Applied Expert Systems, Inc. 2013



Typical Private Cloud Infrastructure

Cloud User Tools





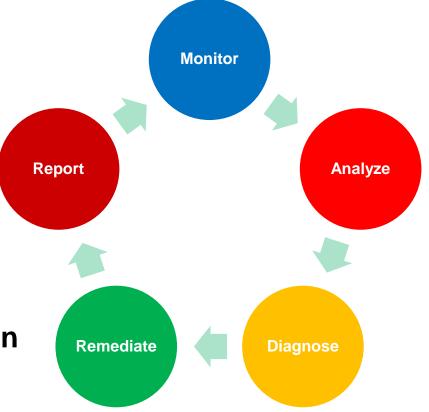
Core Business Services





Managing Cloud Data Center

- Fundamentals of management apply FCAPS
 - Fault
 - Configuration
 - Availability
 - Performance
 - Security
- Leading to
 - Service level achievement
 - Optimum resource utilization
 - Highly available systems
 - High performing systems





Background

Performance Challenges

Maintaining Mainframe Network Performance in a Cloud

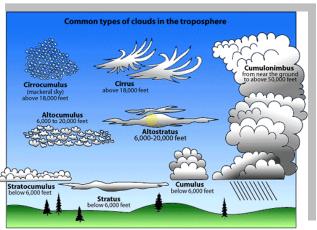




Approaches

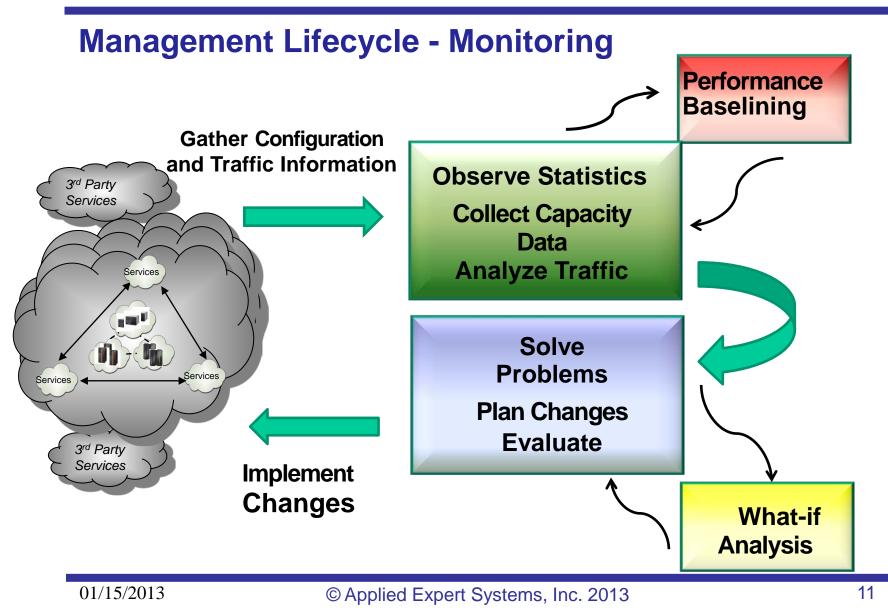
Top Down or bottom Up doesn't matter Consistency does

- Applications
- Middleware
 - Guest OS
 - VM
 - Network

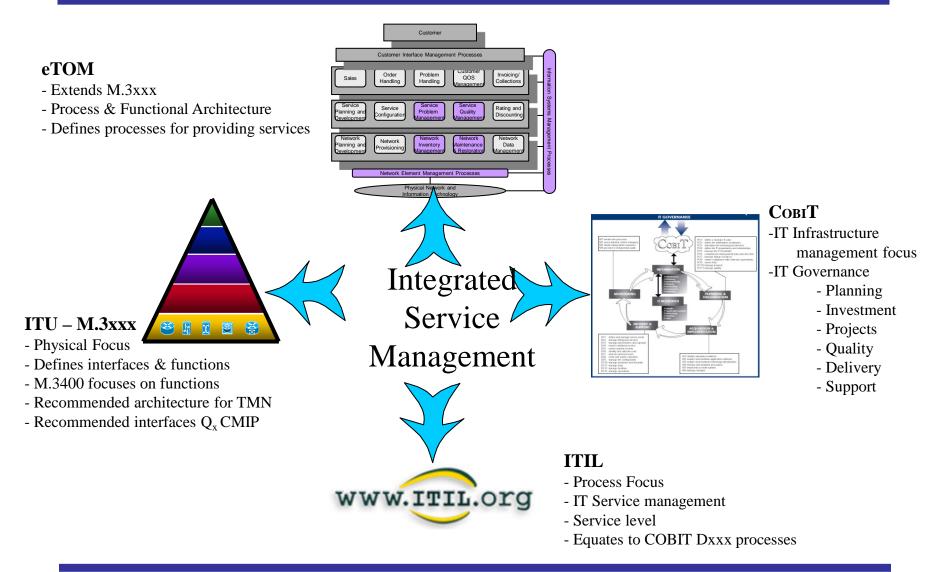






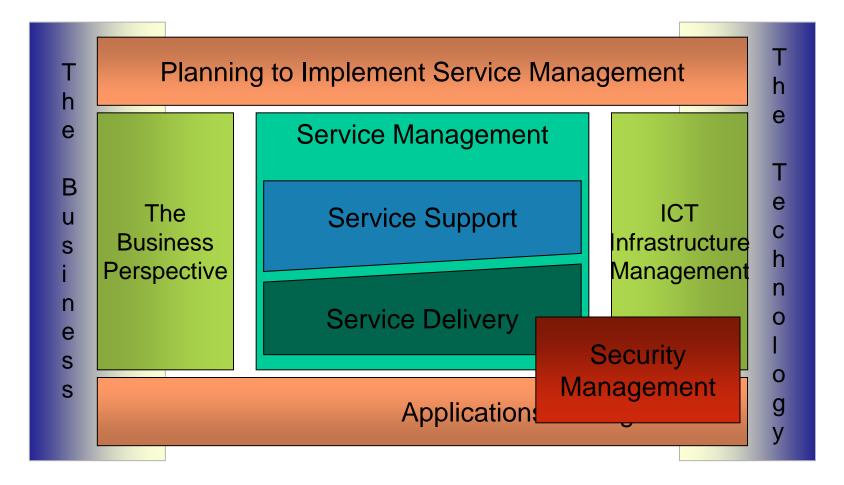








ITIL





Cloud Performance Risks

Challenge	Consideration	Impact
Provisioning response delay or failure	Multitude of reasons that could impede provisioning process especially faulty provisioning policies	Application or service slow down or failure
Performance unpredictability or service unavailability	Incomplete understanding of topology at time of performance issue	Significant increase in time to remediate
Arrival rates of workloads	Seasonal and time dependent aspects of workloads are not always considered	Inability of provisioning systems to respond resulting in application or service slow down or failure



Public Cloud Performance Risks

Challenge	Consideration	Impact
Isolation and visibility of component parts for performance testing	Existing performance tools are blocked from accessing component parts due to security issues	Reliance on vendor for data points and no guarantees you are getting what you pay for.
Distance and skinny straw problems	Greater distances results in higher latency and a smaller network pipe results in bottlenecks	Degradation of response time, application timeouts, application failures



Public Cloud Performance Risks

Challenge	Consideration	Impact
Application workflow characteristics	Applications with the same number of tasks, data transfer quantities have different resource use characteristics	Definitive trade-off between performance and cost. Weigh the resource performance versus the overall cost
I/O, memory, CPU, and VM usage	Pricing is often based on usage of these resources	Does cloud provisioning software take cost issue into decision process
I/O bound applications	Require high performance infrastructure	Use of commodity infrastructure components may impede response time



Steps to Effective Performance Management

Monitor

Establish Baselines

Monitor over a long period of time to develop baselines and trends

Data analysis with no preconceived bias for capacity and performance trend development and any time dependencies

Report on trends, changes, and exceptions

Baseline re-evaluation and resetting

Review and Remediate

Analyze

01/15/2013



Background

Performance Challenges

Maintaining Mainframe Network Performance in a Cloud



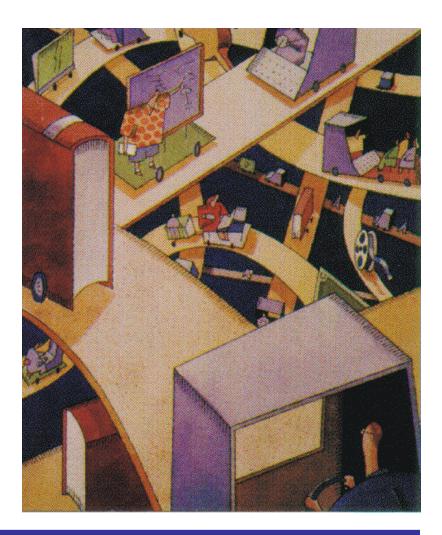


IP Resource Bottlenecks

CPU Memory Buffering, queuing, and latency Interface and pipe sizes Network capacity Speed and Distance Application Characteristics

Results in:

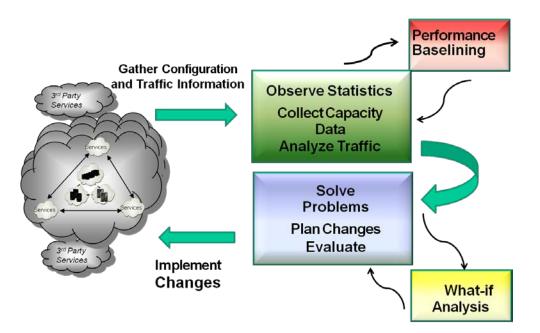
Network capacity problems Utilization overload Application slowdown or failure





Information to Collect

Link/segment utilization **CPU** Utilization Memory utilization **Response Time** Round Trip Time Queue/buffer drops Broadcast volumes Traffic shaping parameters **RMON** statistics Packet/frame drop/loss Environment specific





CPU Utilization

In Virtualized systems CPU utilization can be misleading

Running low on CPU any system can cause immediate application failure system slowdown impacting all applications need to restart system

Running low on CPU can cause immediate application failure domino effect on related resources and applications intermittent application oddities





Questions to Answer on CPU Utilization

How much CPU a applications using

What is the histori CPU usage in app

Server Port: 3306

Monitor Name : Linux SLES11PS2i5 Monitor IP Address : 137,72,43,204

Node Name Node Address Hour

SLES11PS2i586 137.72.43.204 0

SLES11PS2i586 137.72.43.204 1

SLES11PS2i586 137,72,43,204 2

SLES11PS2i586 137.72.43.204 3

Date: 03/01/2011 Start Hour:0

End Hour:23

							Server:	137.72.4	3.204	Server Port: 33	06 User ID): adr	nin4					Logoff S	elect No	de Help
U	a	e t	the				CAES									Cleve	rView	◎ for TCP	/IP or	n Linux
- !	- (n n						•	LinuxView	🏁 Con	nect Expert		∕ <i>S</i> Lin	nkView	C	PinPoint				
sin	g	<u>?</u>					MIB Lookup)	00				Thru24	Proces	ses			Wed M	ar 2 2011	06:43:31 UTC- Refresh
			vie				Critical Resources LinkView PortMon ProcessVie				Thru24 Summa	ry for	Node Name S CPU Usage/Interv		PS2i586 Proces Average Storage Used (KiloBytes)	ses				
a	уp	IICa	atio	ns	<u> </u>		Protocols				Current:		58	499.72		348.57				
							ICMPv4				Last:		58	483.79		357.72				
							ICMPv6				Since Midnight:		15	110.38		241.72				-
Port: 3	306	U	ser ID: adm	nin4					Logoff Selec	ct Node Hel										
							Clever\	/iew®	for TCP/IP	on Linux					1/3	B Found 2	24 Items	First Prev Next La	st	
🏁 Co	nnect	Expert	_		LinkView	(PinPoint		Wed Mer 21	2011 06:53:32 UTC	Process Name	CPU Usea	ige Total	CPU Useaç	ge/Interval	Maximun Storage L	lsed	Average Storage Used		
				Inru	199 PTOCES	5565			vved Marz.	Refresh			764	13	63.69		0			
										Kerresn	init		764	12	63.68		0			
				Th00	1	Desert							46546	54	16.56		48		48.0	
x SLES11		;		THIU99	Links Hourly	укероп				ſ				0	0.0		0			
137.72.4	3.204										khelper			0	0.0		0			
														0	0.0		0		0.0	
			24 items four	nd, displayi	ng 1 to 20.[F	irst/Prev] 1, 2 [N	ext/Last]			-										
Address	Hour	Process ID	Process Type	Process Name	Process Status	CPU Centiseconds - Interval	CPU Centiseconds - Total	Storage Size (Bytes)	Process Run Path	Process R										
2.43.204	0	10470	application	mysqld	runnable	0	8014577	24208	/usr/sbin/mysqld	basedir=/usr datadir=/var/lil user=mysqlp file=/var/lib/my skip-external port=3306										
2.43.204	1	10470	application	mysqld	runnable	0	12037883	36312	/usr/sbin/mysqld	basedir=/usr datadir=/var/lil user=mysqlp file=/var/lib/my skip-external port=3306										
2.43.204	2	10470	application	mysqld	runnable	0	12054266	36312	/usr/sbin/mysqld	basedir=/usr datadir=/var/lil user=mysqlp file=/var/lib/my skip-external port=3306										
2.43.204	3	10470	application	mysqld	runnable	0	12071623	36312	/usr/sbin/mysqld	basedir=/usr datadir=/var/lit user=mysqlp file=/var/lib/my										

Server Dert: asse

Licor ID: admind

01/15/2013

Server: 137.72.43.204

LinuxView

00

GAES

MIB Lookup

DNS Look A V TCP

UDP

Thru24 Links Thru24 Processes

Snapshot

 Thru24 Response Time

🗄 Thru24 Workload History

Thru99

SNMP

Response Time • Thru99 Workload

Thru99 Links

© Applied Expert Systems, Inc. 2013

Sonior: 427 72 42 204



Scenario 1 – Linux CPU Usage High Situation

A client had a very successful beta with Linux on system z. As they added additional workloads onto the Linux systems overall CPU was increasing much higher then when the application was running on a standalone server.

Trouble Shooting

Using a Linux TCP/IP Monitor check the overall flow of information through both the IP and TCP layers. The CPU utilization was viewed over time. Verify that listeners are available for the applications. View alerts and determine if any would suggest the problem being seen. Check the buffer count. In this system the buffer count had never been raised and was still set at 16.

Solution

Increasing the buffer to 50 reduced the CPU utilization for this linux server as we added more applications.

As you increase the buffer additional memory will be used

SUSE SLES11: in /etc/udev/rules.d/51-qeth-0.0.f200.rules add ACTION=="add", SUBSYSTEM=="ccwgroup", KERNEL=="0.0.f200", ATTR{buffer_count}="128"



Response Time

No one is ever happy with what they get

External customers may go elsewhere

Where is the problem? Network? Router have long queus? Is the LAN to slow? Is the route long? Operating system? Too long to queue for transmit? Application? Protocol? Window size improperly set? MTU size improperly set?





Now and Historical Response Time

	7.72.43.204	Server Port: 3306	User ID: admin4						Logoff	Select Nod	e Help		
AES							(CleverVie	w [®] for T	CP/IP on	Linux		
	LinuxView	8	Connect Expert		LinkView	Q	PinPoint						
MIB Lookup	Lindation	,	Some Expert	т	hru24 CriticalRe	sources			We	ed Mar 2 2011 0	7:16:16 UTC-		
DNS Lookup	0 0 ×										Refresh		
Thru24				Thru24	Summary for Crit	ical Resources							
Processes				Response	Time	% Packet Loss							
Thru24			Current:		58		66						
Response			Last:		58		66						
Time			Since Midnight:		7349		66						
Critical													
Resources	· · · · ·						1/2 Found 9 Ite	ms First Prev N	lext Last		=		
PortMon						1		1			-		
Thru24		Server: 137.72.43.2	Server Port:	3306	User ID: admin4						Lo	goff Select N	lode
Workload		AES								Clayer	Niouv® fe	or TCP/IP o	n Lini
listory		A ALS								Cieve			n Linu
Thru99 Links		🚱 I	LinuxView	🖗 Connect I	Expert	1	LinkView		PinPoint				
-Thru00												Wed Mar 2 201	1 07:14:07
<u>Thru99</u>						С	ritical Resourc	ces					
Processes		🕾 MIB Lookup				C	ritical Resourc	ces			_		Refre
		MIB Lookup	0 0			C	ritical Resourc	ces					Refre
Processes Thru99 Response			0 0										Refre
Processes Thru99		DNS Lookup		1002/586			ritical Resourc						Refre
Processes Thru99 Response Time		DNS Lookup	Monitor Name : Linux SLES1 Monitor IP Address : 137.72										Refre
Processes Thru99 Response Time <u>Critical</u> Resources		DNS Lookup	Monitor Name : Linux SLES1 Monitor IP Address : 137.72 Daily Report	.43.204									Refre
Processes Thru99 Response Time	E	DNS Lookup	Monitor Name : Linux SLES1 Monitor IP Address : 137.72	.43.204		Criti	cal Resources Da	ily Report					Refre
Processes Thru99 Response Time Critical Resources PortMon	E	DNS Lookup Thru24 Links Thru24 Processes Thru24 Response	Monitor Name : Linux SLES1 Monitor IP Address : 137.72 Daily Report	.43.204		Criti 11 iten	cal Resources Da Is found, displayin	ily Report 19 all items.1					Refre
Processes Thru99 Response Time Critical Resources PortMon	E	DNS Lookup	Monitor Name : Linux SLES1 Monitor IP Address : 137.72 Daily Report	.43.204		Criti 11 iten cal Resource Name	cal Resources Da Is found, displayin IP Address	i ly Report Ig all items.1 Packet Size F	Response Time				Refre
Processes Thru99 Response Time Critical Resources PortMon	E	DNS Lookup Thru24 Links Thru24 Processes Thru24 Response Time Critical	Monitor Name : Linux SLES1 Monitor IP Address : 137.72 Daily Report	.43.204	02/07/2011 ww	Criti 11 iten cal Resource Name w.whitehouse.gov	cal Resources Da is found, displayin IP Address 173.222.58.135	ily Report Ig all items.1 Packet Size F 64	Response Time 19	% Packet Loss 0 0			Refre
Processes Thru99 Response Time <u>Critical</u> <u>Resources</u> <u>PortMon</u>	E	DNS Lookup Thru24 Links Thru24 Processes Thru24 Response Time Critical Resources	Monitor Name : Linux SLES1 Monitor IP Address : 137.72 Daily Report	.43.204	02/07/2011 ww 02/08/2011 ww	Criti 11 iten cal Resource Name	cal Resources Da is found, displayin IP Address .73.222.58.135 .73.222.58.135	ily Report g all items.1 Packet Size 64 64	Response Time				Refre
Processes Thru99 Response Time Critical Resources PortMon Thru99	E	DNS Lookup Thru24 Links Thru24 Processes Thru24 Response Time Critical	Monitor Name : Linux SLES1 Monitor IP Address : 137.72 Daily Report	.43.204	02/07/2011 ww 02/08/2011 ww 02/09/2011 ww	Criti 11 iten cal Resource Name w.whitehouse.gov w.whitehouse.gov	cal Resources Da is found, displayin IP Address 73.222.58.135 73.222.58.135	ily Report g all items.1 Packet Size 64 64	Response Time 19 20	0			Refre
Processes Thru99 Response Time Critical Resources PortMon Thru99		DNS Lookup Thru24 Links Thru24 Processes Thru24 Response Time Critical Resources PortMon	Monitor Name : Linux SLES1 Monitor IP Address : 137.72 Daily Report	.43.204	02/07/2011 ww 02/08/2011 ww 02/09/2011 ww 02/10/2011 ww 02/11/2011 ww	Criti 11 iten cal Resource Name w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov	cal Resources Da is found, displayin IP Address .73.222.58.135 .73.222.58.135 .73.222.58.135 .73.222.58.135	g all items.1 Packet Size F 64 64 64 64 64 64	tesponse Time 19 20 19 20 19	0 0 0 0			Refre
Processes Thru99 Response Time Critical Resources PortMon Thru99		DNS Lookup Thru24 Links Thru24 Processes Thru24 Response Time Critical Resources PortMon Thru24	Monitor Name : Linux SLES1 Monitor IP Address : 137.72 Daily Report	.43.204	02/07/2011 ww 02/08/2011 ww 02/09/2011 ww 02/10/2011 ww 02/11/2011 ww 02/12/2011 ww	Criti all item cal Resource Name w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov	cal Resources Da is found, displayin IP Address 73.222.58.135 73.222.58.135 73.222.58.135 73.222.58.135 73.222.58.135	ily Report g all items.1 Packet Size 64 64 64 64 64 64 64 64	Response Time 19 20 19 20 19 16	0 0 0 0 0			Refre
Processes Thru99 Response Time Critical Resources PortMon Thru99		DNS Lookup Thru24 Links Thru24 Processes Thru24 Response Time Critical Resources PortMon Thru24 Workload	Monitor Name : Linux SLES1 Monitor IP Address : 137.72 Daily Report	.43.204	02/07/2011 ww 02/08/2011 ww 02/09/2011 ww 02/10/2011 ww 02/11/2011 ww 02/12/2011 ww 02/13/2011 ww	Criti 11 iten cal Resource Name w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov	cal Resources Da Is found, displayin IP Address 73.222.58.135 73.222.58.135 73.222.58.135 73.222.58.135 73.222.58.135 73.222.58.135	ily Report g all items.1 Packet Size 64 64 64 64 64 64 64 64 64 64	Response Time 19 20 19 20 19 16 16	0 0 0 0 0 0 0			Refr
Processes Thru99 Response Time Critical Resources PortMon Thru99		DNS Lookup Thru24 Links Thru24 Processes Thru24 Response Time Critical Resources PortMon Thru24	Monitor Name : Linux SLES1 Monitor IP Address : 137.72 Daily Report	.43.204	02/07/2011 ww 02/08/2011 ww 02/09/2011 ww 02/10/2011 ww 02/11/2011 ww 02/12/2011 ww 02/13/2011 ww 02/13/2011 ww	Criti cal Resource Name w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov	cal Resources Da is found, displayin IP Address 73.222.58.135 73.222.58.135 73.222.58.135 73.222.58.135 73.222.58.135 73.222.58.135 73.222.58.135	ily Report g all items.1 Packet Size 64 64 64 64 64 64 64 64 64 64	tesponse Time 19 20 19 20 19 16 16 16 19	0 0 0 0 0			Refre
Processes Thru99 Response Time Critical Resources PortMon Thru99		DNS Lookup Thru24 Links Thru24 Processes Thru24 Response Time Critical Resources PortMon Thru24 Workload	Monitor Name : Linux SLES1 Monitor IP Address : 137.72 Daily Report	.43.204	02/07/2011 ww 02/08/2011 ww 02/09/2011 ww 02/10/2011 ww 02/11/2011 ww 02/12/2011 ww 02/13/2011 ww 02/14/2011 ww	Criti 11 iten cal Resource Name w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov	cal Resources Da is found, displayin IP Address 73.222.58.135 73.222.58.135 73.222.58.135 73.222.58.135 73.222.58.135 73.222.58.135 73.222.58.135	ily Report g all items.1 Packet Size F 64 64 64 64 64 64 64 64 64 64	Response Time 19 20 19 20 19 16 16	0 0 0 0 0 0 0			Refr
Processes Thru99 Response Time Critical Resources PortMon Thru99		DNS Lookup Thru24 Links Thru24 Processes Thru24 Processes Thru24 Response Time Critical Response Time Critical Response Thru24 Workload History Thru29 Links	Monitor Name : Linux SLES1 Monitor IP Address : 137.72 Daily Report	.43.204	02/07/2011 ww 02/08/2011 ww 02/09/2011 ww 02/10/2011 ww 02/11/2011 ww 02/13/2011 ww 02/13/2011 ww 02/13/2011 ww 02/15/2011 ww	Criti 11 item cal Resource Name w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov	cal Resources Da is found, displayin IP Address 73.222.58.135 73.222.58.135 73.222.58.135 73.222.58.135 73.222.58.135 73.222.58.135 73.222.58.135 73.222.58.135	illy Report g all items.1 Packet Size 64 64 64 64 64 64 64 64 64 6	Response Time 19 20 19 20 19 16 16 16 19 21				Refre
Processes Thru99 Response Time Critical Resources PortMon Thru99		DNS Lookup Thru24 Links Thru24 Processes Thru24 Response Time Critical Resources PortMon Thru24 Workload History	Monitor Name : Linux SLES1 Monitor IP Address : 137.72 Daily Report	.43.204	02/07/2011 ww 02/08/2011 ww 02/09/2011 ww 02/10/2011 ww 02/11/2011 ww 02/13/2011 ww 02/13/2011 ww 02/13/2011 ww 02/15/2011 ww	Criti 11 item cal Resource Name w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov w.whitehouse.gov	cal Resources Da is found, displayin IP Address 73.222.58.135 73.222.58.135 73.222.58.135 73.222.58.135 73.222.58.135 73.222.58.135 73.222.58.135 73.222.58.135 73.222.58.135	illy Report g all items.1 Packet Size 64 64 64 64 64 64 64 64 64 6	Response Time 19 20 19 20 19 16 16 16 19 21 19				Refr



Scenario 2– Slow Application Response

Situation

A client had a Linux on system environment and they were about ready to grow the production use of Linux. One of the applications accessed an outside website which was critical to the service the application provided. As they moved the application to a virtualized system they noticed a decline in response time. What was causing the added time?

Trouble Shooting

Using a Linux TCP/IP Monitor check the overall flow of information through both the IP and TCP layers. Since outside resources were required they were set up as critical resources and monitored for packet loss and response time. The response times were measured before the move and after the move.

Solution

It was determined that after the move the firewall in front of the virtualized server needed to be reconfigured in order to return the overall response time to normal.



System Utilization

Since you cannot over-provision your system (add as much memory as you want, as much DASD, etc) you need to optimize

Determining what is currently being used on the system will assist in determining how much you can grow the system

An application behaving poorly may be due to improper design, improper setting of system resources to use, or application configuration

Sluggishness of a system may be due to not enough CPU, I/O overloads, or queue latencies

Server: 137.7	2.43.204	Server Port	3306	Use	er ID: ad	min4											L	ogoff	Select Nod	le H
AES																Clever	View® f	or TCF	/IP on	Linu
_	C LinuxView			P Conr	ect Expe	ert		_		∰Link			Q PinPoir	nt						
MIB Lookup	00									L	inuxView						12	Wed I	Mar 2 2011 (sh: 30	Refre
Monitor	· 2										Nodes									
Connect Expert					Cr	itical Re	esource	Alerts-A	vailability:	Performa	nce: 📕	Ports Alerts	-Availability	Perfo	rmance:	É.				
PortMon	Node Name	Node Address	Link Alerts	Process Alerts	TCP Alerts	UDP Alerts	IP Alerts	ICMP Alerts	IP Datagrams In	IP Datagrams Out	TCP Connections	TCP Segments In	TCP Segments Out	TCP Retrans. Segments	TCP Active Open	TCP Passive Open	TCP Attempt Fails	TCP Errors In	CPU (centi sec)	Storag (KB)
ProcessView	SLES11PS2i586	<u>137.72.43.204</u>	2	51	Q	1	Q	: 1	435	493	0	3288	3289	0	162	159	4	0	240819	47
ICMPv4	C3	222 92 43 204									N	ode Inactive								
in.a.																net Protected				100%





Scenario 3– Can I Add more Applications Situation

A task force was recommending adding additional applications to the virtualized mainframe. The initial move went well and they wanted to increase the usage of Linux and decrease their distributed servers. The task force approved the move without looking at any data to see if the system could handle the workload.

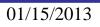
Trouble Shooting

Due to the environment OSA was inspected to see if it could handle the traffic. CPU utilization was investigated on both the VM and Linux partitions. On the Linux system the ethernet interface was checked to see how loaded it was. While the task force made a broad and quick decision a lot of worked followed to ensure a tuned system.

Solution

In order to prevent future fragmentation issues we reset the MTU size to 1492 and defined that as the standard for their linux systems. While this didn't cause an issue when the workload on Linux was small over time it could be a major problem.

Server:	137.72.43.204	Server Port: 3306	User ID:	admin4										Logoff Se	elect Node
AES												CI	everView∉	ofor TCP/	ΊΡ on Linι
	LinuxView		🕫 Connect E	Expert			1	LinkView			Q PinPoint				
MIB Lookup								Thru99 Li	nks					Wed Ma	r 2 2011 07:28:03
DNS Lookup	0.0														Refre
TCP	Monitor IP Daily Report							Thru99 Links D	aily Report						
History		01/2011 to 03/02/2011				81 items fo	und, disp	playing 1 to 20.(F	irst/Prev] 1, 2, 3	3, 4, 5 (Ne	xt/Last]				
Thru99 Lin		Node Name	Node Address	Date	Interface	Type	Speed	Admin Status	Oper Status	MTU	Thru-put In Bytes/Sec	Thru-put Out Bytes/Sec	Bytes In	Bytes Out	
Thru99 Processes		SLES11PS2i586 SLES11PS2i586				ethernetCsmacd softwareLoopback	10000		up	1500	489 2106			33850597 181754922	





Overall Connections

Most Resources, applications, network components connect with either TCP or UDP

If a TCP listen is not available then a service will not be able to function

AES		di la						
	Section 2017 Secti	Connect Expert	LinkView Connect Expert (SLES11PS2	Q PinPoin	t		Wed Mar 2 2011	07.42
/IB Lookup			Connect Expert (SEESTIPS2	(1366 137.72.43.204)			wed Mar 2 2011	
NS Lookup	00							Re
×								
rotocols ^	TCP I	Listeners		UDP	EndPoints			
itor								
	Local Address	Local Port	Local Address	Local Port	Rmt Addre	SS	Rmt Port	
onnect (pert	0.0.0.0	22	0.0.0.0		111 0.0.0.0			0
itical	0.0.0.0	111	0.0.0.0		161 0.0.0.0			0
sources	0.0.0.0	3306	0.0.0.0		627 0.0.0.0			0
kView	0.0.0.0	6688	0.0.0.0		631 0.0.0.0			0
rtMon ≡	127.0.0.1	25	0.0.0.0		37575 0.0.0.0			0
ocessView	127.0.0.1	199						
	127.0.0.1	631						
otocols	127.0.0.1	6010						
ICMPv4				TCP C	onnections			
ICMPv6			Local Address	Local Port	Rmt Address	Rmt Port	State	
Pv4			0.0.0.0		0.0.0.0	KIIILPOIL	0 listen	<u> </u>
Pv6								
<u>CP</u>			0.0.0.0		0.0.0.0		0 listen	
<u>JDP</u>			0.0.0.0		0.0.0.0		0 listen	
shot			0.0.0.0		0.0.0.0		0 listen	
ru24 Links			127.0.0.1	25	0.0.0.0		0 listen	



Connections

Server: 137.72.	43.204 Sei	rver Port: 3306	Us	er ID: admin4								Logoff Select	Node He
AES										Cle	verView	◎ for TCP/IP	on Linux
	LinuxView		🖉 Cor	inect Expert				Q PinPoi	nt				
MIB Lookup						TCP						Wed Mar 2 2	011 07:47:52 UT
	00												Refresh
DNS Lookup													
						TCP Daily	Report						
UDP	Monitor Name : Linux Monitor IP Address : 1												
History	Daily Report Dates: 02/01/2011 to 03												
Thru99 Links	Dates, 02/01/2011 to 03	5/02/2011			27 items f	ound, displaying 1 to 2	0.[First/Prev] 1, 2 [Nex	t/Last]					
Thru99	Node Name	Node Address	Date	Throughput - Segments In	Throughput - Segments Out	Segments In Errors	Retrans Segments	Num Connections	Max Connections	Active Open	Passive Open	Dropped Connections	Attempt Fails
Processes	SLES11PS2i586			17	17	0	0	8	0	75002	74281	5	182
🖻 Thru99	SLES11PS2i586			44	44	0	9	40	0	180730	179193	8	43
Response	SLES11PS2i586			55	55	0	6	152	0	230814	230558	89	
Time	SLES11PS2i586			2745	2741	0	5064	112	0	11614634	11277297	29169	
Critical	SLES11PS2i586			59	60	0	0	35	0	251860	249964	1	47
Resources	SLES11PS2i586			60	60	0	0	41	0	251810	249914	0	
	SLES11PS2i586			60	60	0	15	150	0	250612	248781	84	
PortMon	SLES11PS2i586			61	61	0	185	157	0	249210	247219	11	
Thru99	SLES11PS2i586			58	59	0	71	134	0	236708	233963	15	
	SLES11PS2i586			60	60	0	24	103	0	252732	249165	12	
Workload	SLES11PS2i586			37	37	0	26	101	0	155014	153078	80	
CMPv4	SLES11PS2i586			39	40	0	222	90	0	160446	158576	12	
ICMPv6	SLES11PS2i586			67	67	0	151	131	0	283711	280118	17	
	SLES11PS2i586			69	69	0	191	141	0	289421	286073	24	
<u>IPv4</u>	SLES11PS2i586			69	69	0	1	138	0	287813	284173	12	
IPv6	SLES11PS2i586			69	69	0	0	130	0	290268	286614	1	71
TCP	SLES11PS2i586			68	68	0	0	142	0	288702	285053	0	
	SLES11PS2i586			67	68	0	0	127	0	284967	281319	0	
UDP	SLES11PS2i586			67	66	0	75	181	0	276108	273045	19	
CN 110	SLES11PS2i586	137.72.43.204	02/23/2011	68	68	0 Export options: CSV	143 Excel XML PDF	151	0	275486	271875	13	710
SNMP						Export options, CSV	ENGOLI VIIIE I L DL						
Utilities 📮													
	-									Internet I D.	rotected Mode: C	ff 6	• 🔍 100% •



Scenario 4– Excessive Segmentation

Situation

As you can see on the previous chart on 2/4/2011 there were a significant number of segmented TCP packets, dropped connections, and failed attempts. What was going on?

Trouble Shooting

Using a Linux TCP/IP Monitor check the overall flow of information through both the IP and TCP layers. The OSA adapter was inspected and traffic was moving through it smoothly. Look at the MTU settings on your links and the fragmentation on the IP stack. While there was not significant fragmentation, the MTU size was set at 1500. This wasn't a good value for IP fragments, but this would not impact TCP Segmentation.

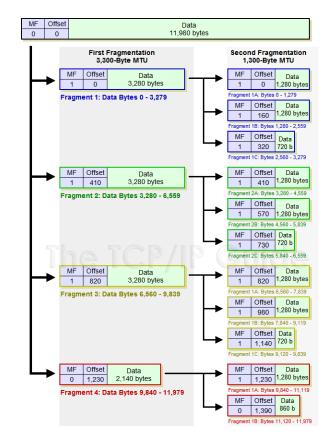
Solution

It was clear that this Linux system was not using 'Large-Send' The default for Linux is no. We changed this to TSO which now had segmentation done by the OSA adapter freeing up resources in the Linux system.



MTU Size

- Optimizing MTU size can provide optimum performance improvements
- Set the maximum size supported by all hops between the source and destination
- Traceroute can provide details on the MTU size but some router administrators block traceroute
- If you application sends
- frames <= 1400 bytes use an MTU size of 1492
- Jumbo frames use and MTU size of 8992
- TCP uses MTU size for window size calculation
- For VSWITCH an MTU of 8992 is recommended





Scenario 6– Excessive Fragmentation

Situation

A client had a Linux on system environment and they were about ready to grow the production use of Linux. While they did not have any major problems they new of they asked for an overall health check.

Trouble Shooting

Using a Linux TCP/IP Monitor check the overall flow of information through both the IP and TCP layers. Look at the MTU settings on your links and the fragmentation on the IP stack. While there was not significant fragmentation, the MTU size was set at 1500.

Solution

In order to prevent future fragmentation issues we reset the MTU size to 1492 and defined that as the standard for their linux systems

Server: 13	7.72.43.204	Server	r Port: 3306	User ID	admin5									Lo	ogotf Se	lect Node Hel
AES													CleverVi	ew® f	or TCP/	P on Linux
	Cinux/View		_	P Connect	Expert	_		(Juni			- 2	Q PinPoint				
ME Lookup	00							LIN	kView				_		AutoRefresh:	9 2011 13:20:21 UTC
DNS Lookup	00														- Autoreant	30 Refresh
onfiguration		2						Int	erfaces							
ommands erts		Index	Interface	Node Name	Node Address	Last Checker	d Type	Speed	Admin Status	Oper. Status	MTU	Thru-Put In Bytes/Sec	Thru-Put Out Bytes/Sec	Bytes In	Bytes Out	
onitor		1	ło	SLES11PS2586	137 72 43 204	15:00:30	softwareLoopback	10000000	up	ир	16435	8063	8063	967613	967613	
napshot		2	eth0	SLES11PS2686	137.72.43.204	15:00:30	ethemetCsmacd	10000000	up	up	1500	1519	1112	182346	133544	
istory NMP																
tilities																



Linux: OSA LAN Timer or Blocking Timer

OSA inbound blocking function

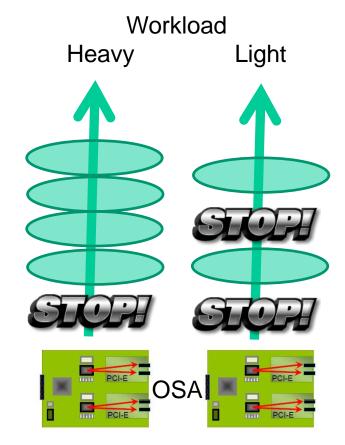
- Determines how long OSA will hold packets
- Indirectly affects
 - Frequency of host interrupt
 - Payload per interrupt

Linux has 3 potential values for OSA2

- For frames under 1536:Time between 2 incoming packets
- For Jumbo frames: Duration of inter-packet gap
- Total duration that OSA holds a single inbound buffer
- Default mode is NO LAN idle which is a good compromise for both transactional and streaming workloads

Linux behaves differently with OSAExpress3

 Using the default for OSA2 results in short latency but high CPU utilization





Scenario 7 – High CPU Utilization after move to OSA3

Situation

A system with an even mix of transactional and streaming workloads had a hardware upgrade and was now running with an OSA3 adapter. The Linux CPU became excessively high for no clearly visible reason.

Trouble Shooting

Historical data was viewed to ensure that the spike in CPU activity did occur when the OSA3 adapter was activated. In viewing the bytes in/out and other workload data no glaring inconsistencies were seen.

Solution

When the change was made the original OSA2 values for BLKT were used (inter=0, inter_jumbo=0, total=0). Due to the difference in OSA2 and OSA3 behavior these numbers were changed (inter=5, inter_jumbo=15, total=250). CPU utilization returned to normal OSA2 default value on OSA3 results in shortest latency and highest CPU utilization

Best to use MTU size of 1492 for OSA3

Supported in SLES10SP3+kernel update SLES 11 RHEL 5.5

Red Hat: /etc/sysconfig/networkscripts/ifcfg-eth0 add OPTIONS="blkt/inter=5 blkt/inter_jumbo=15 blkt/total=250"

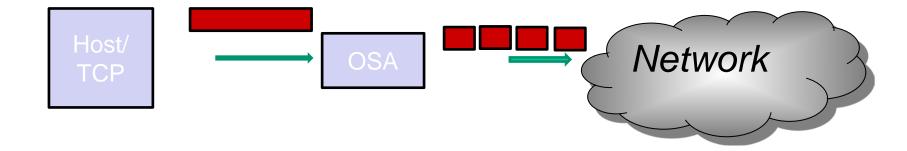


TCP Segmentation Offload (Large Send)

Segmentation consumes large amount of CPU

Allows most IPv4 TCP segmentation processing to be handled by OSA

Increases data transfer efficiency for IPv4 packets





Scenario 8 – 2 Tiered Database System

Situation

Client had a 2 tiered Database system and OSA 3 adapters. The front end database servers created many TCP/IP connections with high transactional volumes. The responses resulted in large TCP segments and the CPU utilization was unbearable.

Trouble Shooting

Look at the detailed TCP connections and transfer information. Use a packet trace tool. Is there a correlation between large segments sizes resulted in excessive CPU utilization. If so, go in an looking at the OSA adapter TCP Offload was not turned on.

Solution

TCP Segmentation was turned on for the OSA adapter.

On average anywhere from 25% to 45% CPU improvement was observed.

Use the large_send parameter

- no: no large send
- TSO: OSA adapter does
 segmentation
- EDDP: the qeth driver performs segmentation

TCPIP will still do segmentation for:

- LPAR-LPAR packets
- IPSec encapsulated packets
- - When Multipath is in effect (unless all interfaces support segmentation offload)



Scenario 9 – Linux Hipersocket Performance Slow Situation

A client had a very successful beta with Linux on system z. As they added additional workloads onto the Linux systems overall network performance declined. Hipersockets was used and the expectation was that performance should have been better.

Trouble Shooting

Using a Linux TCP/IP Monitor check the overall flow of information through both the IP and TCP layers. Verify that listeners are available for the applications. View alerts and determine if any would suggest the problem being seen. Check the buffer count. In this system the buffer count had never been raised and was still set at 16.

Solution

Tests by IBM have shown that using the default of 16 limits throughput as the number of parallel sessions increases with HiperSockets. The buffers were increased to 50 with acceptable results As you increase the buffer additional memory will be used

SUSE SLES11: in /etc/udev/rules.d/51-qeth-0.0.f200.rules add ACTION=="add", SUBSYSTEM=="ccwgroup", KERNEL=="0.0.f200", ATTR{buffer_count}="128"



Cloud Computing.... It's a Journey

A Simple Idea

Clear Tenets

	 User: Builds a web application, Using a standard platform Using a standard database Upload this application to a cloud provider Only pays for what is used Everything else is an implementation 	 Application Flexibility Standardized Increasing "click to run" services Live in remote Internet data centers Scalable to millions Procurement
Mul	 detail. Cloud provider automatically Provisions the services Scales the application and the database together ti-faceted Enablement 	 Efficient Rapid Commoditized "Pay by the sip" Security Simplified Streamlined
•		Processes entric Services as-a-Service Security (Certification & Accreditation)



Murphy's Law

If anything can go wrong, it will

If anything just cannot go wrong it will

Left to themselves, things tend to go from bad to worse

If everything seems to be going well, you have obviously overlooked something





AES Sessions

Session	Title	Day	Time	Room
12152	IPv6 Basics	Tuesday February 5	1:30 PM	Golden Gate 4
12777	Network Problem Diagnosis with Packet Traces	Wednesday February 6	9:30 AM	Golden Gate 3
12778	Performance Factors in Cloud Computing	Wednesday February 6	11:00 AM	Golden Gate 4
12150	I'm Running IPv6 How Do I Access?	Wednesday February 6	3:00 PM	Golden Gate 4
12158	Managing an IPv6 Network	Thursday February 7	11:00 AM	Golden Gate 4
12149	Kick Start your IPv6 Skills using your home network	Friday February 8	8:00 AM	Golden Gate 4
12153	IPv6 Deep Dive	Friday February 8	9:30 AM	Golden Gate 4





© Applied Expert Systems, Inc. 2013