

Tuning Tips To Lower System z Costs with OMEGAMON® Monitoring

#SHAREorg

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IBM.

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IBM System z Service Management continues providing customers improved business flexibility





Key Takeaways

- Attempting to manage with 70s techniques and thresholds not effective or efficient
- 2. Modern approaches using modern tools yields reduced problem source identification times with less overhead
- 3. Redesigned OMEGAMON ® provides significant customer value to reduce costs and decrease risks



Application Performance Management is a key component of Mainframe Service Management

Application performance management (APM) refers to discipline within service management focused on monitoring and managing of performance and service availability .

- End-user experience monitoring
- Application and Services subsystem monitoring
- Application runtime architecture discovery, modeling and display
- User-defined transaction profiling
- **Application performance** analytics







APM – Not equal to monitoring resources



- 1976 OMEGAMON classic created
 - Original product focused on monitoring hardware failures and resource restraints
- 1990 OMEGAMON CUA created, copied all the exceptions and thresholds and created warning and critical thresholds
- 1996 Candle Command Center (CCC) created, copied all the CUA exceptions and thresholds provided migration utility from CUA
- 2004 Tivoli Enterprise Portal Server, new UI w/ same situations / thresholds as CCC

- Migration path allowed customers to continue to monitor the way they always did, using the same thresholds
- MVS (OS/VS2R2 and later) 1974
 - MVS/SP 1980 (24 bit addr)
 - MVS/XA 1983 (32 bit addr)
 - MVS/ESA 1988
 - WLM in V5.1
 - OS/390 1995
 - z/OS 2000 (64 bit addr)
- MVS IPS/ ICS converted to WLM
 - Customer continue to focus on resources instead of SLAs



Categorize





- All alerts aren't critical to availability or real-time performance
- All alerts aren't equally expensive to collect and analyze
- Use the lowest overhead with maximum benefit



S H A R E Tethnology - Connections - Results

Categorize



	Benefit>					
0						
V						
е	Low Benefit /	High Benefit /				
r	High Overhead	High Overhead				
h						
е						
a	Low Benefit /	High Benefit /				
d	Low Overhead	Low Overhead				



Tune -High benefit and high overhead

When disabling is not an option

- Adjust scope and frequency.
- Substitute there may be more than one way to detect the same situation; not all these have the same overhead.
- Policies use low overhead detected to enable higher overhead analysis



Use Modern tools and methods

- Monitor Workload throughput instead of resources
 - WLM Performance Index
 - OMEGAMON RTA or SLA (zIIP Enabled)
- Use Bottleneck analysis to identify resources
 - Look at resource performance on demand when issues
 - Enable resource (rule of thumb) monitoring dynamically when SLO issue exist due to bottleneck on that resource
- Continue to monitor constrained resources that can cause stalls or outages
 - Use low overhead symptom detection to enable higher overhead in-depth analysis



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XE for z/OS Situations



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- Referencing Real storage Attributes
 - Convert UIC situation to System_Paging_Activity attribute Unreferenced_Interval_Count
 - Eliminate other Real_Storage situations or start w/ policy based on UIC situation true

Chasing Control block chains for UCB, Real storage, Common Storage is expensive



Examples of low cost ways to ensure same protection



- Use 1 situation to monitor CSA and ECSA warning and use display item to show where. Use warning to dynamically start critical. Don't frequently monitor SQA or ESQA as they will overflow w/o issue.
- Use CICS SLA violations w/ bottleneck data to enable resource monitoring. Consider SLA history as alternative to ONDV to VSAM or use ONDV to data space



Maximize benefits and minimize overhead



- Manage what is important
 - Workload throughput vs resources
 - Production vs test
- Install Hiper performance maintenance
 - False Assumption If its not ABENDing I don't need maintenance
- Assign appropriate thresholds
 - False Assumption Default thresholds and false alarms can't hurt me



Resource Growth = Monitoring CPU growth

- DASD original limit (FF) 255 devices
 - Current data centers 2K,5K, 20K on an LPAR
 - Impacts OMEGAMON (z/OS, CICS, IMS)
- Real Storage
 - MVS 16mb, low threshold 2048K
 - z/OS 1.9 128gb, now 4TB
 - Z990 256gb, z9 512gb, z10 > 512gb
- Common Storage
 - MVS only below the line 16mb (OS + Private area)
 - z/OS ECSA up to 2048M (ePrivate area)
- UIC counter (z/OS 1.7 10sec ASID update, now global LRU)
 - Original limit 255, threshold for pain 10
 - z/OS 1.7 and below 2540
 - z/OS 1.8+ 65535, threshold 10, should be 40K

- SMF record size (80% of OCCI)
 - 2.1.2 320
 - 3.3 448
 - 4.1 572
 - 5.1 / TS 1.1 680
 - 5.2 / TS 1.2 740
 - 5.3 / TS 1.3 1288
 - 6.1 / TS 2.1 1564
- Transaction rate, elapsed time
 - More shorter = higher fixed
 - Impacts RTA, SLA
- TCT Size growth
 - Checking connections from TORs expensive, check from AORs





Non-OMEGAMON Hiper Performance APARs



- z/OS APARs—
 - ESQA OA34865
 - XCF OA35436
 - GRS OA33898





MQSeries APAR

Performance Events

 OA34372 -events not
 purged from Current
 Events, impacts XE
 table size and
 therefore CPU



SHARE Technology - Cannecilians - Results

GRS APAR – Task Cycle vs APAR

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OMEGAMON XE z/OS – Large Resources

- OMEGAMON XE for z/OS (w/ Situations or Workspaces;)
 - Referencing Common Storage Attributes
 - OA37619, OA37647, OA38162 avail 12/1/11
 - OA36726 avail 06/22/11 CSA Sort
 - Referencing MVS_DASD attributes
 - OA38126 PTF UA63483 avail 12/7/11
 - If situations do not reference Cache attributes, low CPU w/ APAR
- OMEGAMON II for MVS CUA (all users)
 - Storage light
 - CPU in Classic from Real Storage XMEM exception
 - OA37619, OA37647, OA38162 avail 12/1/11
 - Eliminates XMEM call if only UIC being tested
- OMEGAMON for MVS classic (all users)
 - Exception analysis of Common Storage
 - OA37619, OA37647, OA38162 avail 12/1/11
 - Converts XCSA and XECS to use CSAA if running







OMEGAMON XE – Hiper Performance

OMEGAMON XE for IMS

- Dexan and Epilog improvements reduction in DASD UCB scan CPU
 - APAR OA37338/UA63247 11/21/11
- Epilog RESC(DEV) DASD UCB scan improvements
 - APAR OA37921 PTF UA63147 avail 11/17/11
- V420 IF3 (OA36278) ATF and TRF performance and functional improvements
- LROWs and .RC (OMSUB3) APAR OA37766

OMEGAMON XE for DB2

- Exception analysis in 3270 or TEMA, loop in CICS connection exceptions processing RCT.
 - XE DB2 V510 APAR PM30479 PTF UK64243 avail 01/27/11
 - XE DB2 V420 APAR PM27058 PTF UK63351 avail 12/20/10
- V510- base efficiency and Near term history zIIP enabled

OMEGAMON XE for Messaging

- XE APAR OA37944 PTF UA63274, UTF-8 avail 11/24/11
 - Reduces situation overhead on Queues, Channels and Current Events, more
 - Especially helpful to customers w/ QMgrs w/ international character sets







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Assumption: Bad thresholds can't hurt me



OMEGAMON XE – All

 Situations that continuously evaluate true especially if for multiple rows creates extra CPU in TEMS and TEMA.

z/OS

- WAIT False exception trips cause excessive Enqueue and I/O delay analysis
- XMEM Real storage online, high CPU with no value w/ default threshold. Use XUIC with good threshold.
- XLF, ASF Background exception analysis

CICS, IMS

 Duplicates OMEGAMON z/OS collection DASD, DNRS, DRDY, TNRS,(TPDR, TRDY)

DB2

• XOPT ON – Background exception analysis enabled



New commands and messages

- OMEGAMON V420/ V510 PTF UA65400/UA65401
 - Peek has new minor XTCBS which has extended display w/ CPU seconds by TCB
 - CICS each region attach message has TCB address
 - .VTM has new flavor .VTMX which has extended display w/ CPU secs and auto-refresh interval, if in classic autoupdate mode and profile used.

. VTMX	USERID	TERMINAL	MODE	SESSION S	START		LAST	UPDATI	-
+	OMWORK	PRODWORK	TCB	PGM CKS	CYCLE	CPU	SECS	PROF	INT
+	TECH40	N705	VTM	05/15/12	17:33:25		05/15,	/12 17	:36:52
+	00014C00	0007C008	006E5D10	0	50		.49	/C	5



Energy Co – Dispatch application





- Eliminates need to collect the data for every interested user
- Graphic Health view collect once share exceptions
- Rapid link to raw data and alerts in same user interface



Visibility – Reduced Problem Source Identify



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Book Stress	3			Origin	node I	DDF nactive	Global Tr Active	ace E Utili	DM zation	DB Walt Percent	Indou Thread	bt Thre	ads Waiti On Limit	ng 1	Threads Wai On Locks	ting	Jsers Waltin For Thread	ng C s
Energy	Delivery			DBP2:PEC	3:DB2 F	alse I	False		7.1	0.0	0	0		0		0		0
🟵 📫 Eas	t			DB2D:CC0	CC:DB2 F	alse I	False		6.0	1.6	5	0		0		0		0
E B Wes	st			DB1D:DD0	DD:DB2 F	alse I	False		7.0	3.1	1	0		0		0		0
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					3	Energy	Delive	er Regio	ns O	verviev	v							×
CICS Region Name	System ID	CICS Version	Region Status	CICS	VTAM Applid	VTAM	Generic	VTAM AC Open	B Ma	dimum Ta	asks Tr	ansactior Rate	I/O Rate	Page	CPU Utilization	Sto	rage Violatio n Last Hour	one .
C819PD2P	CCCC	5.3.0	N/S	PD2P	PD2PETS	PD2PR	TS	Yes			18	12	3 3.7	0.1	6 31	0		1.
C819PD1P	DDDD	5.3.0	N/S	PD1P	PD1PETS	PD1P8	ETS	Yes			22	19	6 5.0	0,	0 35.	3		F
PRDPECS5	PEC3	5.3.0	N/S	R85	PEBACPS	5 PEBAG	CPS5	Yes			6	9	7 0.2	0.	0 33	2		
回日口× Energy Deliver Response of PA04 & P*																		
Service Class	Inter	val End	System	CICS Re	gion Res	ponse Tir	ne Trar	nsactions Total	Trans	action	Avera	ge e Time	Performa	nce	% Wait	%	Wait	on F
PTRANS	11/25/0	2 13:45:57	0000	C819PD2	P	10:00:01 0	000	567		113	00.00	01.206	much	120	5	in oodi	0	Uni
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															-			



Reduce PSI time through improved visibility of issues

- Automated actions, notification and problem management
 - Take action TEMS vs TEMA vs none
 - TEMA requires 2nd Situation (ITM auto starts)
 - Take action not makes not eligible for shared collection
 - EIF events / SNMP Alerts
 - EIF = Efficient, can be trapped by Netview for z/OS
 - SNMP = Autonomous agent not shared collection
 - Policies to control situations
 - If Situation true, start more detailed analysis, wait, evaluate detail, take action, still true - notify





Situation Synchronization (RKDSRULD)



			1		SHARE
		Sitname			Predicates Technology - Connections - Results
	1			"_Z_ICSF0", 8) AND	
6		_Z_ICSF0_	("SITNAME",	SYSTEM.PARMA("VERSION", "##", 2) AND	(ICSF.PKDSWRITE = -1) OR (ICSF.PKDSREAD = -1
<u>≓</u>					(ICSF.STATUS = 1 AND ICSF.CKDSPCT = 1) OR (
S					ICSF.CRYPTO = 0) OR (ICSF.STATUS = 1 AND
U <	("_Z_ICSF1", 8) AND	ICSF.CCHW = 0) OR (ICSF.CKDSACCESS = 0) OR
Ę		_Z_ICSF1_	("SITNAME",	SYSTEM.PARMA("VERSION", "00", 2) AND	(ICSF.MONSTATUS <> 1);
²					(ICSF.STATUS = 1 AND ICSF.PKACALL = -1) OR (
0)				"_Z_ICSF2", 8) AND	ICSF.STATUS = 1 AND ICSF.CCMK = -1) OR (
		_Z_ICSF2	("SITNAME",	SYSTEM.PARMA("VERSION", "##", 2) AND	ICSF.PCI = -1) OR (ICSF.PCI = 1 AND
	1			"Crypto_CKDS_Access_Disabled", 27) AND	
		Crypto_CKDS_Access_Disabled	("SITNAME",	SYSTEM.PARMA("VERSION", "00", 2)	AND ICSF.CKDSACCESS = 0 ;
				SYSTEM.PARMA VERSION, 00, 2)	AND ICSF.STATUS = I AND ICSF.CKDSPCT = $I;$
		Crupto Internal Error	("SITNAME"	SYSTEM PARMA("VERSION" "00" 2)	
				"Crypto Invalid Master Key" 25) AND	AND 1031 .INONSTATOS <> 1 ,
S		Crypto Invalid Master Key	("SITNAME"	SYSTEM PARMA("VERSION", "##", 2)	AND ICSE STATUS = 1 AND ICSE CCMK = -1
0			(01110 un2 ,	"Crypto No Coprocessors", 22) AND	
÷		Crypto No Coprocessors	("SITNAME",	SYSTEM.PARMA("VERSION", "00", 2) A	AND ICSF.STATUS = 1 AND ICSF.CCHW = 0 ;
ā			, ,	"Crypto No PCI Coprocessors", 26) AND	
<u> </u>	/	Crypto_No_PCI_Coprocessors	("SITNAME",	SYSTEM.PARMA("VERSION", "##",2)	AND ICSF.PCI = -1 ;
ີ ເວັ				"Crypto_PCI_Unavailable", 22) AND	
-	1	Crypto_PCI_Unavailable	("SITNAME",	SYSTEM.PARMA("VERSION", "##", 2) A	AND ICSF.PCI = 1 AND ICSF.PCISTAT <> -1 ;
g				"Crypto_PKA_Services_Disabled", 28) AND	
÷		Crypto_PKA_Services_Disabled	("SITNAME",	SYSTEM.PARMA("VERSION", "##", 2)	AND ICSF.STATUS = 1 AND ICSF.PKACALL = -1 ;
0				"Crypto_PKDS_Read_Disabled", 25) AND	
2		Crypto_PKDS_Read_Disabled	("SITNAME",	SYSTEM.PARMA("VERSION", "##", 2)	AND ICSF.PKDSREAD = -1 ;
U				"Crypto_PKDS_Write_Disabled", 26) AND	
		Crypto_PKDS_Write_Disabled	("SITNAME",	SYSTEM.PARMA("VERSION", "##",2)	AND ICSF.PKDSWRITE = -1 ;
				"Crypto_Service_Unavailable", 26) AND	
		Crypto_Service_Unavailable	("SITNAME",	SYSTEM.PARMA("VERSION", "UU",2)	AND IGSF. $GRYPIO = 0$;
		Crypto Invalid PKA Master Kava		CIYPLO_IIIVAIIO_PKA_WASLEF_KEYS", 30) AND	
		Crypto_invalio_PKA_iviaster_Keys_	U SITINAIVE,	3 1 3 1 1 1 1 1 1 1 1 1 1	AND IOSE FRAIN = -1,

12 original reduced to 3 executions



Service Console enable traces







Custom WTO w/ attributes to MVS Console via Netview for z/OS EIF intercept



<u>D</u>isplay <u>F</u>ilter <u>V</u>iew <u>P</u>rint <u>O</u>ptions <u>S</u>earch <u>H</u>elp SDSF SYSLOG 2.101 MVST MVST 08/24/2011 2W CHARS 'EIF911I' FOUND COMMAND INPUT ===> SCROLL ===> CSR 0090 ★ IF911I N3T_Conn_Rnd_Trip_Time N3T_Conn_Rnd_Trip_Time (Round_Trip_Time>= 100) ON TCPIP:MVST (Round_Trip_Time=2.07) 111082407

Trappable WTO w/ msg id = EIF991I, situation name=N3T_Conn_Rnd_Trip_Time, Threshold= > 100, and raw data= Round_Trip_time=2.07, from OMEGAMON or ITM / ITCAM TEMA







OMEGAMON XE V51x – enhanced 3270

Benefits of new architecture



High Priority OMEGAMON customer capabilities focused on helping decrease costs and reduce risks



Redesigned OMEGAMON Enhanced 3270 User Interface addresses customer requirement to make mainframes more efficient and effective

Customer-Driven Focus Areas for Improvement

- Integrate Move from silo monitoring towards composite views. Provide XE and classic data in common 3270 UI
 - ModernizeMake the 3270 Interface 'Best of breed" –
SME focused Problem Solving Scenarios
- Simplify
 Eliminate complexity and frustration
 - Standardize Align with existing IBM 3270 Applications
 - Reduce footprint, install, configuration, and CPU
 - Customize Personalize User Interface
 - Reduce customer calls/PMRs through simplification





Minimize

Support



Enhanced 3270 User Interface creates Enterprise wide view of information across sysplex



ALL ActiveSysplexesCICSplexesDB2 SSIDs



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Enhanced 3270 User Interface creates Enterprise wide view of information across sysplex



in Anaheim

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- Understand transactions across entire Enterprise
- Ability to define multiple CICSplexes and their members







OMEGAMON V510 vs TEPS - Overhead and responsiveness

- · Less total network traffic, larger packets moved
 - Backwards navigation does not recollect data
 - Sort done at host not in TEPS client workstation
 - Data reductions (filters) done at host not client
- More CPU efficient
 - No Java (Compiled C and assembler)
 - No EBCDIC to ASCII translation required
 - Data collected /moved less frequently
 - Fewer data transfer hops
 - e3270ui Manager does sort instead of TEMS (w/o TEMA filter)
 - Statement of direction e3270 UI Server zIIP enabled



Plexwide response analysis w/ wait reasons



Ability to monitor and understand current activity based on SLAs and KPIs



SLA one service class – Details / bottlenecks by regions



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Command ==> CICSplex Service Class Detail Region :								
CICSplex Transactions for Service Class ATRANS								
Columns <u>6</u> to	Columns <u>6</u> to <u>10</u> of <u>42</u> \leftarrow \rightarrow \uparrow \downarrow Rows <u>1</u> to <u>1</u> of <u>1</u>							
◆Transaction ID	Interval End Timestamp	% Time Using CPU	% Wait on DB2	% Wait on DLI	+% Wait on File			
ATRN	10:14:00	0%	0%	0%				
✓ CI	CSplex Regions	for Service (Class ATRANS					
Columns <u>6</u> to <u>10</u> of <u>42</u> \leftarrow \rightarrow \uparrow \downarrow Rows <u>1</u> to <u>2</u> of <u>2</u>								
♦CICS Region Name	Interval End Timestamp	% Time Using CPU	% Wait on DB2	% Wait on DLI	+% Wait on File			
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SHARE Technology - Connections - Results

UOW – Details for CICSplex

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Command ==> KCPTASD								ICSplex : <u>DEEPLEX</u> Region : <u>CICSDE03</u>
\leq		Task Detai	ls for Task	00178 on C	ICSDE03			
Transaction ID CPU time Storage Used Above 16M Attach time Facility ID Dispatcher Queue Current Program ID. Resource Hame EXEC CICS Command			FUP2 : 0.00000 : 09:21:2 : None : 0491 : Executt : DE02>Af : n/a	Time in S Elapser B Storagy Time of Facilit Task S D First f Resourd A User I Purgeal	n Suspend d Time e Used Belou f Suspend ty Type tate Program ID. ce Type ole Suspend	u 16M		: 08/00:07 : 6m 08s : 1KB : 9:40:09 : ferm : Suspend : TRLINK
Purge Status UOW State Originating Transaction	ID		: No_purg : Inflig : FUP2		Init of	Work (U	oW) sur	nmary
\leq	EIB Details for Task 00176 shows TOR AOR FOR							
EXEC CICS Command. EIBRESP Description. EIBRESP2 Value. Program Offset. Program Offset. EIR Date and Time. Program Offset. Program Offs							or DE02	
<u>~</u>	0	ther tasks in (CICSpler	ch sar				
Columns <u>3</u> to <u>9</u> of <u>9</u>			+ +	↑ ↓		R	ows <u>i</u> to	<u> 2</u> of <u> 2</u>
CICS RegionCTransactionNameID	I Wait Iype	Resource Type	Resource Name	Elapsed Time	CPU Time	Exceeds MAXR Threshold	Task State	
CICSDE01 CICSDE02 FUP2	File MRO	FCIOWAIT IRLINK	TESTF1 DE01>AAA	18m 50s 18m 53s	5.93600s 1.64300s	No No	Suspend Suspend	
			Storage	Usage				
Storage Elements Below 16Meg: 1 Storage Elements Above 16Meg: 1								
Minimiz	e Bar and	PF Key Display	Area					





Customer prioritized Problem Solving scenarios

- Easy to see and find critical system and sub-system information
- Single screen focused on customer defined problems
- Screen content based on problem solving scenarios





New Problem Determination and Management allows Operations and SMEs to see what is happening sooner



Monitor over time to identify and fix potential problems



35 Complete your sessions evaluation online at SHARE.org/AnaheimEval for Session 11791

Use Capacity risks to enable additional detection or take action to reduce low priority workloads ability to run



SHARE Technology - Cannetijans - Results

V510 e3270 – vs Classic

Reduced Problem source identification time

- Single sign on to monitor environment
- Customer designed common diagnostic navigation
- Unit of work cross system views
- Multiple Sysplex, CICSplex and DB2plex views
- Updated w/ latest metrics
- Complete WLM metrics

Reduced number of address spaces

- One Tivoli OMEGAMON Mgr can serve multiple hubs
 Multiple managers can back each other up
 - Multiple managers can back each other up
- Data retrieval agent runs in existing TEMS or TEMAs
 - Multiple DRAs can be configured for failover and performance



OMEGAMON Architecture Comparison IMS **Today V4.20** CICS z/OS Classic CUA 7 STCs 3270 CICS CUA Storage 3270 XE MfN TEMS TEP **TEMAs** DB2

OMEGAMON v510

Messaging



Client Response - Pre vs post filters





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IBM System z Service Management continues providing customers improved business flexibility





Key Takeaways

- Attempting to manage with 70s techniques and thresholds not effective or efficient
- 2. Modern approaches using modern tools yields reduced problem source identification times with less overhead
- 3. Redesigned OMEGAMON® provides significant customer value to reduce costs and decrease risks



OMEGAMON® Family announcement includes significant new capability

General Availability

- OMEGAMON XE for z/OS V510
- OMEGAMON XE for CICS V510
- OMEGAMON XE for DB2 V511

Statement of Direction

- Enhanced 3270 User Interface will additionally be included in:
 - OMEGAMON XE for IMS
 - OMEGAMON XE for Messaging
 - OMEGAMON XE for Storage
 - OMEGAMON XE for Mainframe Networks
- Additional zIIP enablement
- Keep an eye out for additional OMEGAMON Betas







Tivoli System z Sessions at SHARE



Monday

11:00 1:30	11207: Automating your IMSplex with System Automation for z/OS 11832: What's New with Tivoli System Automation for z/OS	Platinum 7 Elite 1
1:30	11896: Problem Solving with Consolidated Logs	Grand Salon A
3:00	11886: Improve Service Levels with Enhanced Data Analysis	Elite 1

Tuesday

9:30	11792: What's New with System z Monitoring with OMEGAMON	Elite 1
11:00	11791: Tuning Tips To Lower Costs with OMEGAMON Monitoring	Platinum 8
1:30	11900: Understanding Impact of Network on z/OS Performance	Grand Salon A

Wednesday

9:30	11835: Automated Shutdowns using either SA for z/OS or GDPS	Elite 1
1:30	11479: Predictive Analytics and IT Service Management	Grand Salon E/F
1:30	11899: Top 10 Tips for Network Perf. Monitoring w/ OMEGAMON	Platinum 9
4:30	11836: Save z/OS Software License Costs with TADz	Elite 1

Thursday

8:00	11887: Learn How To Implement Cloud on System z	Grand Salon E/F
9:30	11905: Using NetView for z/OS for Enterprise-Wide Mgmt and Auto	Grand Salon A
11:00	11909: Get up and running with NetView IP Management	Grand Salon A

Friday

9:30 11630: Getting Started with URM APIs for Monitoring & Discovery Elite 1



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SHARE Technology - Connections - Results

For More Tuning information

- IBM Redbook OMEGAMON XE Deep Dive on z/OS SG24-7155-0
- Short Tuning articles on the Web Google search – Zeunert Site:IBM.COM
- Recent info Linkedin group 'Tivoli OMEGAMON Performance specialists'



For more details on what's new with OMEGAMON family please attend these additional webcasts in the series







Register at: http://www-01.ibm.com/software/os/systemz/webcast/sysmgmt/series/



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Contact Lih Wang at LihWang@us.IBM.com for: Omaha, NE- Aug 23, 2012; Chicago, IL- Sept 2012; Springfield, IL- Sept 2012; Minneapolis, MN- Oct 2012; Des Moines, IA- November 2012

Contact Steve Hackenberg at HackenbS@us.IBM.com for: Dallas, TX- Aug 14, 2012; Austin, TX- Oct 2012; Huston, TX- Nov 2012



