

Improve Service Levels with Enhanced Data Analysis

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IBM

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Session Number 12791



Agenda



- Why do we need IBM zAware?
- What is IBM zAware?
- IBM zAware complements your existing environment
- IBM zAware and Tivoli
 - Event Management
 - Automation
 - Problem Determination and MTTR
 - Traditional Performance Monitoring
 - Monitoring the IBM zAware environment

Excerpt from the IBM EC12 Announce letter

IBM zAware: With IBM zEnterprise EC12 (zEC12), IBM introduces a new technology, IBM zAware, based on machine learning developed by IBM Research. IBM zAware is designed to use near real-time continuous learning algorithms, providing a diagnostics capability intended to help you quickly pinpoint problems, which in turn, can help you to more rapidly address service disruptions. IBM zAware uses analytics to intelligently examine z/OS messages to find unusual patterns, inconsistencies, and variations.

Large z/OS operating system environments can sometimes generate more than 25 million messages per day. This can make manual analysis time-consuming and error-prone when exceptional problems occur. IBM zAware uses machine learning to help your organization gain visibility into system behavior, helping you to optimize service, respond to problems quicker, and increase availability.

IBM plans to provide **new capability within the Tivoli Integrated Service Management family of products** designed to leverage analytics information from IBM zAware, and to provide alert and event notification.

IBM zAware ...

Systems are more complex and more integrated than ever

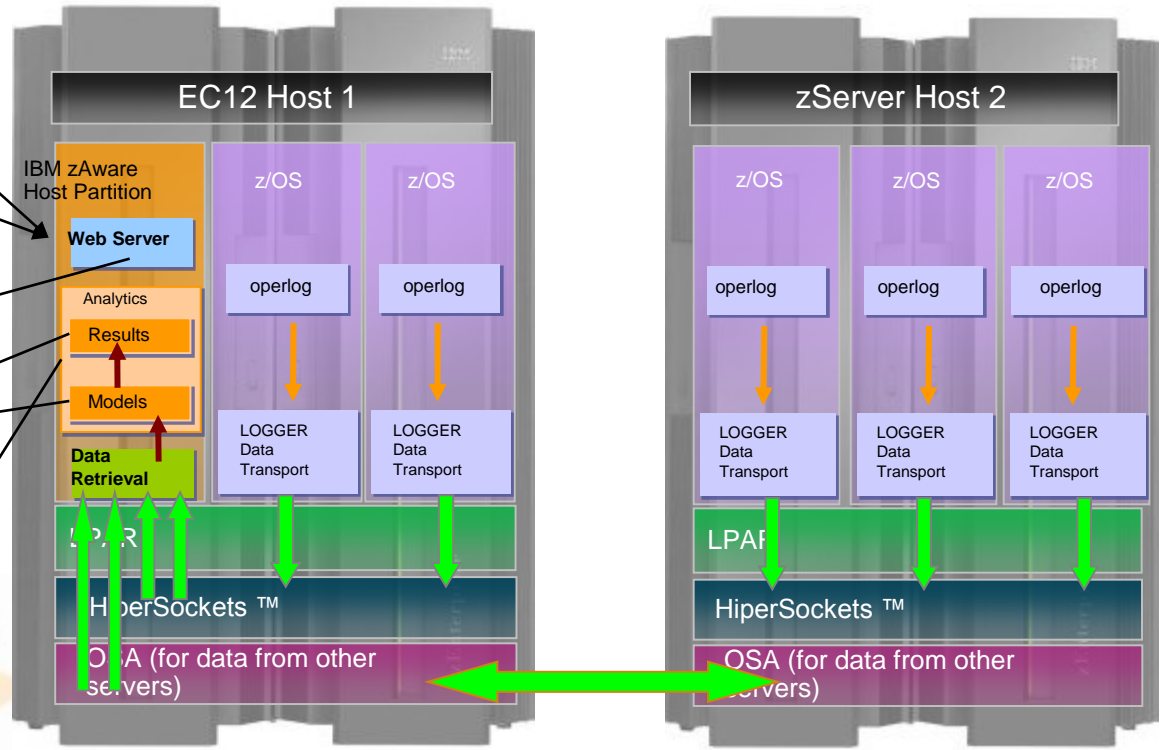
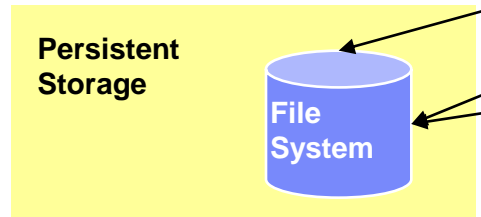
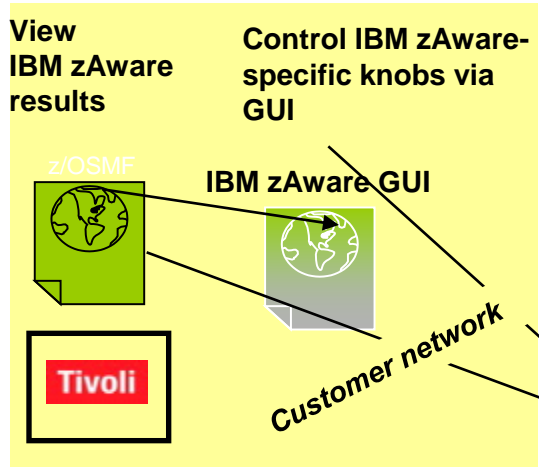
- **Errors can occur anywhere in a complex system**
- **Some problems are particularly...**
- **Difficult to detect**
 - Several allowable anomalies can build up over time
 - Symptoms / problems can manifest for hours or days
 - Problem can grow, cascade, snowball
- **Difficult to diagnose**
 - Sometimes finding the *system* in error is a challenge
 - Volume of data is not humanly consumable, *especially* when seconds count
- ***Need information and insight***



What is IBM zAware?

- z/OS Log Analytics - Analysis of z/OS operlog
- Firmware appliance that runs 'out of band' (not on z/OS)
- Training period determines 'normal' message flow, volumes, etc.
- Surfaces anomalies to help detect 'soft failures'

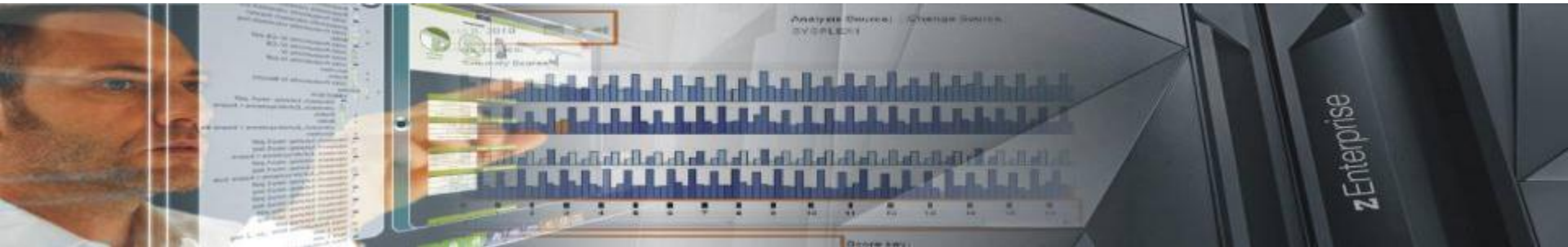
IBM zAware is a priced feature being offered with *IBM zEnterprise EC12* (Available on 9/19/2012)



IBM zAware – Identifies unusual system behavior

IBM zAware contains sophisticated analytics, applies IBM insight, and machine learning to understand your unique system

Monitoring	Detection	Frequency	Reporting
<ul style="list-style-type: none"> Supports IBM and non-IBM middleware and applications Monitors OPERLOG in a sysplex or monoplex Assigns a message anomaly score to help identify potential issues 	<ul style="list-style-type: none"> Detects anomalies other solutions might miss Can find the rare or infrequent message Can detect an unusual number of normal messages Can detect messages issued out of context 	<ul style="list-style-type: none"> Samples every 2 minutes 10-minute interval Uses 90-day rolling baseline; a utility provided to populate baseline; flexibility provided History kept for 2 years (default) 	<ul style="list-style-type: none"> Near real-time analysis Intuitive reporting – both high level and drill down Color-coded browser display XML output can feed ISVs or processes <ul style="list-style-type: none"> Tivoli provides event notifications and integration with service management capabilities



How can IBM zAware Improve Problem Determination?

- Identify messages indicating a possible z/OS incident is happening
 - Which image is behaving abnormally?
 - Examines unique messages
 - High score generated by
 - *unusual messages or message patterns*
 - When did this unusual behavior start?
 - For a selected 10 minute interval either the current 10 minute interval or past intervals
 - Which message ids are unusual?
 - How often did the message occur?
 - When did the message start to occur?
 - Were similar messages issued in the past?
 - Similar characteristics, Same pattern?
- After a change has been made
 - Are unusual messages being issued following changes ?
 - New software levels (operating system, middleware, applications)
 - Updated system settings / system configurations
- When diagnosing the cause of an intermittent problem
 - Are new unusual messages being issued in advance of the problem?
 - Are more messages issued then expected?
 - Are messages issued out of normal pattern or context?

Vertical bar shows the number of unique messages in a 10 minute interval
 Scoring of messages color coded from common (blue) to rare (orange)

Finds Anomalies that would be Hard to Detect



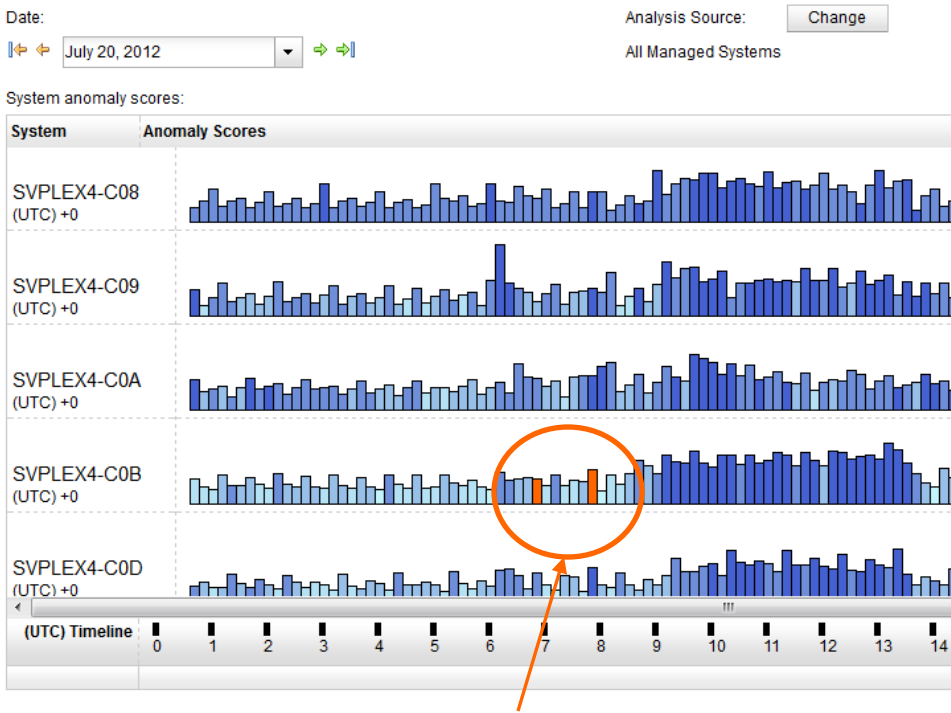
IBM zAware – User Interface

IBM System z Advanced Workload Analysis Reporter



- Monitors z/OS OPERLOG including all messages written to z/OS console, including ISV and application generated messages
- Detects things typical monitoring systems miss due to:
 - Message suppression (message may be too common)
 - Useful for long-term health issues
 - Uniqueness (message not common enough)
 - Useful for real-time event diagnostics
- Color-coded, easy-to-use web browser GUI
- XML Output can feed other products

Analysis



Ability to drill down for details on anomalies



Sample Output - Interval View

Drill down to see JES2 resource shortage

Interval View for System CB88

Date:

July 1, 2012

Analysis Source:

All Managed Systems

Time interval (local time):

04:00 AM -- 04:10 AM

Interval anomaly score:

99.7

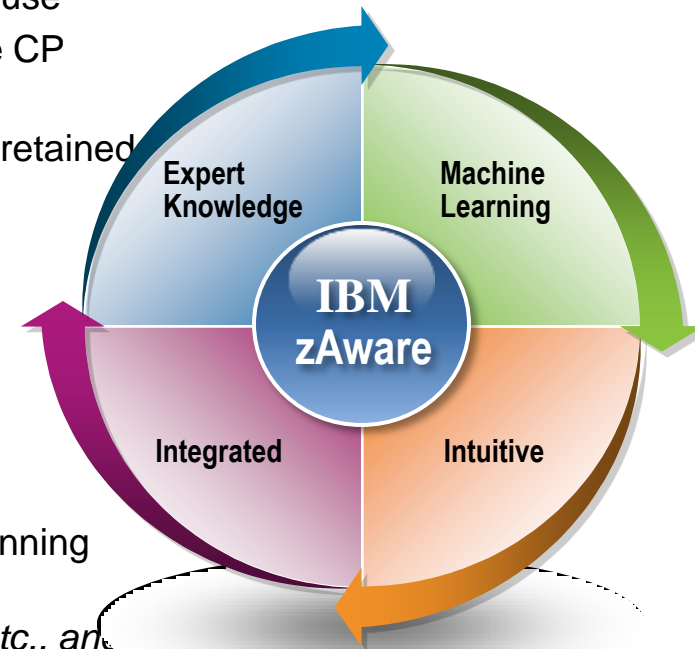
Actions										
Anomaly Score	Interval Contribution Score	Message Context	Rules Status	Appearance Count	Time Line	Message ID	Message Example	Rarity Score	Component	Cluster ID
1	0.226	new	None	1		EYUXS1004W	M88CM88 Interval Timing queue element shortage detected	101	EYUXS	-1
1	0.226	new	None	1		EYUXS1005I	M88CM88 Interval Timing queue element shortage relieved	101	EYUXS	-1
1	0	in_context	IMPORTANT	16		HASP050	JES2 RESOURCE SHORTAGE OF TGS - 100% UTILIZATION REACHED	50	HASP	102
0.999	10.974	unclustered	None	57		IEE043I	A SYSTEM LOG DATA SET HAS BEEN QUEUED TO SYSOUT CLASS M	2	IEE	-1
0.998	6.706	unclustered	None	7		EYUCL0016I	M88CM88 Send Link Task terminated for MRO Network connection with CMAS M8AC.M8A.	74	EYUCL	-1
0.998	6.519	unclustered	None	4989		ITP136I	ADSWCB G2APA001 G2LUA001-1 LU IS NOW INACTIVE 00.02.50.86	27	ITP	-1
0.987	4.427	unclustered	None	40		IEC070I	209-220,NETVIEW,NETVIEW,DSILOGS,683C,NE	12	IEC	-1

IBM zAware Operating Requirements

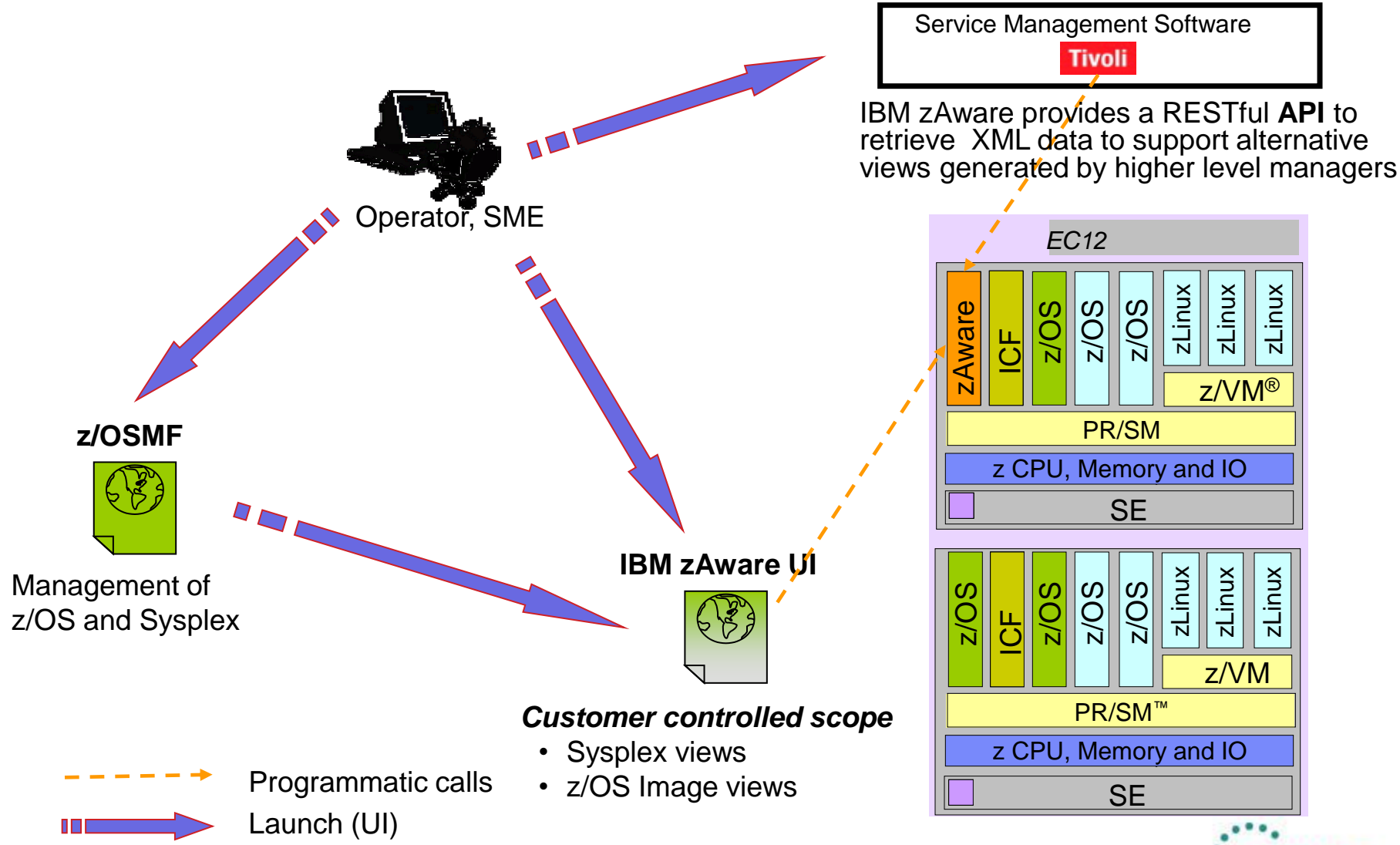
- zEC12 to host IBM zAware Server
 - IBM zAware requires it's own LPAR and runs it's own self-contained firmware stack.
 - This will reduce the number of LPARs available for customer use
 - IBM zAware processor resources can be IFL or General Purpose CP
 - Memory and DASD resources are dependent on the number of monitored clients, amount of message traffic, length of time data retained
 - Memory - Min 6GB + 256 MB
 - DASD ~ 500GB (ECKD or FC)
 - Network: HiperSockets or OSA ports – for both gathering of instrumentation data, and outbound alerting/communications
 - Need dedicated IP address for partition

- zAware Monitored Clients
 - IBM zAware monitored clients can be on any System z Server running z/OS 1.13 + PTFs
 - *IBM zEnterprise 196 (z196), IBM zEnterprise 114 (z114), etc., and can share log files via IP network with IBM zAware server*

- 90 days historical syslog or OPERLOG data to initially prime IBM zAware



IBM zAware Complements Your Existing Environment



IBM zAware and Tivoli Service Management - A powerful Combination

Get the more from the zAware feature by **integrating** with **Tivoli Service Management**. Tivoli will utilize the zAware API to integrate log analysis with existing service management capabilities.

- Provide visibility into IBM zAware anomalies via Event Management
- Improve MTTR through integration with existing problem determination and performance monitoring tools
- Identify system errors and eliminate subsequent occurrences thru automation and more sophisticated analysis

IBM zAware is NOT a replacement for traditional performance and availability monitoring tools. It's just the opposite. When used in conjunction with existing service management tools, it can provide a VERY powerful combination to help achieve 24/7 uptime, improve MTTR when problems occur and help avoid subsequent problems.

Service Management – Value-Add with NetView

Why incorporate insights from zAware with NetView?

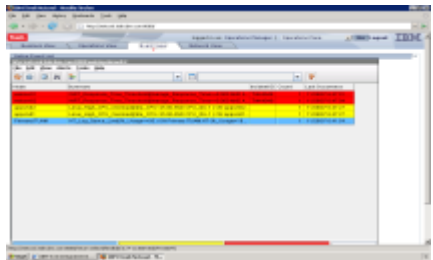
NetView already provides a complete set of Service Management functions to enable customers to surface Events, perform Problem Determination, reduce Mean Time to Recovery and automate.

- Network Availability (SNA, TCP/IP, FTP, OSA, EE/HPR, etc)
- Automation (Messages, EIF Events, SNMP Traps, etc)
- HA/DR (SA, GDPS, Active/Active, etc)
- REXX and High-Level Language support
- Problem Determination tools (Command Support, IP Trace, CANZLOG, etc)
- ...

IBM zAware, Automation, Event Management and PD Tools



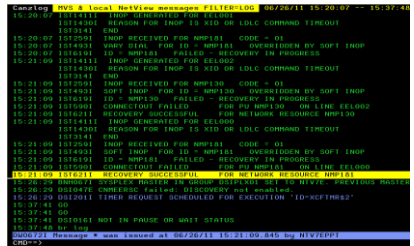
SHARE
Technology - Connectors - Results



View event in Active Event List
Generate trouble ticket



Operator, SME

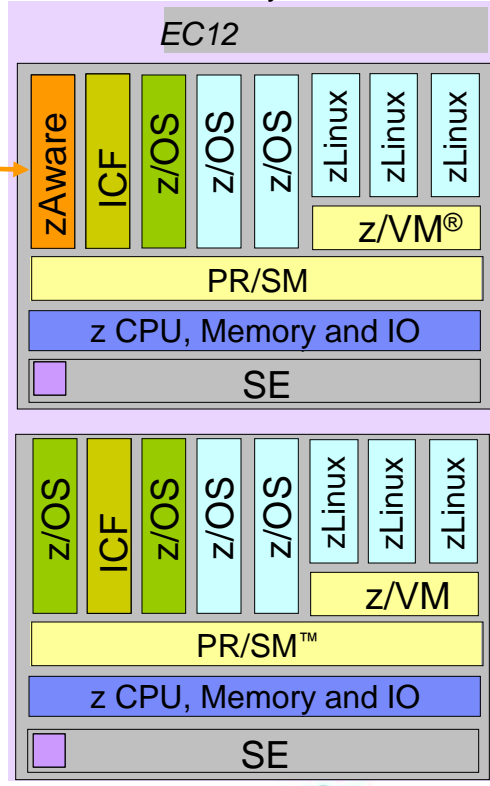


Browse NetView CANZLOG
Perform PD for anomaly



- NetView processing ...**
- Query zAware (10 minute interval)
 - If anomaly detected
 - Generate 'anomaly' message
 - Generate Event
 - SME - Browse NetView CANZLOG to perform problem determination

- NetView samples provided to generate anomaly message and event(s) - Available for download from Service Management Connect
- NetView integration referenced from IBM zAware Redbook
- IBM Services (optional) available to install and configure zAware and NetView

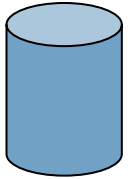


NetView for z/OS: Expanded Log Browse

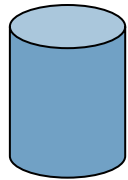


CANZLOG = Consolidated Audit, NetView and z/OS Log

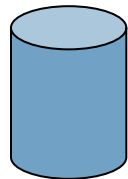
Netlog



Syslog



Joblogs



```
Canzlog MVS & local NetView messages FILTER=LOG 06/26/11 15:20:07 -- 15:37:48
15:20:07 IST1411I INOP GENERATED FOR EEL001
          IST1430I REASON FOR INOP IS XID OR LDLC COMMAND TIMEOUT
          IST314I END
15:20:07 IST259I INOP RECEIVED FOR NMP181 CODE = 01
15:20:07 IST493I VARY DIAL FOR ID = NMP181 OVERRIDDEN BY SOFT INOP
15:20:07 IST619I ID = NMP181 FAILED - RECOVERY IN PROGRESS
15:21:09 IST1411I INOP GENERATED FOR EEL002
          IST1430I REASON FOR INOP IS XID OR LDLC COMMAND TIMEOUT
          IST314I END
15:21:09 IST259I INOP RECEIVED FOR NMP130 CODE = 01
15:21:09 IST493I SOFT INOP FOR ID = NMP130 OVERRIDDEN BY SOFT INOP
15:21:09 IST619I ID = NMP130 FAILED - RECOVERY IN PROGRESS
15:21:09 IST590I CONNECTOUT FAILED FOR PU NMP130 ON LINE EEL002
15:21:09 IST621I RECOVERY SUCCESSFUL FOR NETWORK RESOURCE NMP130
15:21:09 IST1411I INOP GENERATED FOR EEL000
          IST1430I REASON FOR INOP IS XID OR LDLC COMMAND TIMEOUT
          IST314I END
15:21:09 IST259I INOP RECEIVED FOR NMP181 CODE = 01
15:21:09 IST493I SOFT INOP FOR ID = NMP181 OVERRIDDEN BY SOFT INOP
15:21:09 IST619I ID = NMP181 FAILED - RECOVERY IN PROGRESS
15:21:09 IST590I CONNECTOUT FAILED FOR PU NMP181 ON LINE EEL000
15:21:09 IST621I RECOVERY SUCCESSFUL FOR NETWORK RESOURCE NMP181
15:26:29 BNH067I SYSPLEX MASTER IN GROUP DSIPLX01 SET TO NTV7E. PREVIOUS MASTER
15:26:29 DSI047E CNMEERSC failed: DISCOVERY not enabled.
15:26:29 DSI201I TIMER REQUEST SCHEDULED FOR EXECUTION 'ID=XCFTMR$2'
15:37:41 GO
15:37:41 GO
15:37:41 DSI016I NOT IN PAUSE OR WAIT STATUS
15:37:48 br log
DW0672I Message * was issued at 06/26/11 15:21:09.845 by NTV7EPPT
CMD==>
```

NetView CANZLOG – Browse in zAware context



- Browse NetView CANZLOG in context of zAware anomaly
- Set filter and timeframe to view related messages in CANZLOG (consolidated log)
- Perform problem determination in context of timeframe of the anomaly

Set appropriate filters?

Launch to proper Timeframe

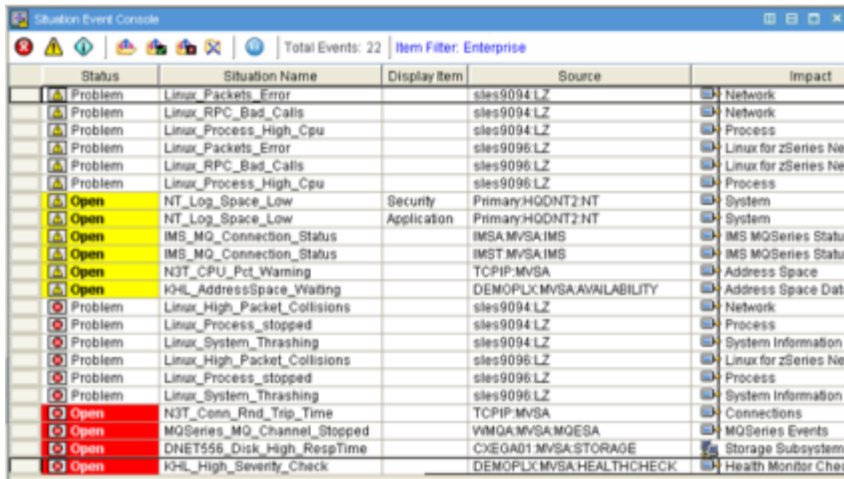
```
Canzlog MVS & local NetView messages FILTER=LOG 11/06/12 16:50:04 -- 16:50:04
16:50:04 ZAI0001I Interval Results.
      System :          UTCPLXSB-SP0
      Interval:    2012-09-25T09:30:00.000Z
      Anomaly  :          72.0
-----
      Anomaly  Message      Count      Cluster      Contribution  Rarity
0.997000    CSQE008I         6      UNCLUSTERED      6.425         76.0
0.987000    CSQX209E         2      UNCLUSTERED      4.452         50.0
0.987000    CSQX501I         6      UNCLUSTERED      4.419         38.0
0.959000    CSQX191I         1      UNCLUSTERED      3.217         26.0
0.939000    FPEV0511I        1      UNCLUSTERED      2.809         39.0
0.939000     IEC070I         52      UNCLUSTERED      2.808         16.0
0.929000    CSQX202E         2      UNCLUSTERED      2.664         28.0
0.888000    DFS2864I        28      UNCLUSTERED      2.199          8.0
0.878000    CSQX004I         1      UNCLUSTERED      2.107         28.0
0.807000     IGD104I         1      UNCLUSTERED      1.648         12.0
0.795000    CNZ4100I         1      UNCLUSTERED      1.588         20.0
0.770000     IEF237I         1      UNCLUSTERED      1.473          3.0
0.767000     AOF313I         5      UNCLUSTERED      1.458          2.0
-----
                                END OF DATA -----
16:50:04 ZAIGET - Starting
TO SEE YOUR KEY SETTINGS, ENTER 'DISPFK'
CMD==>
```


Service Management – Value Add with OMEGAMON

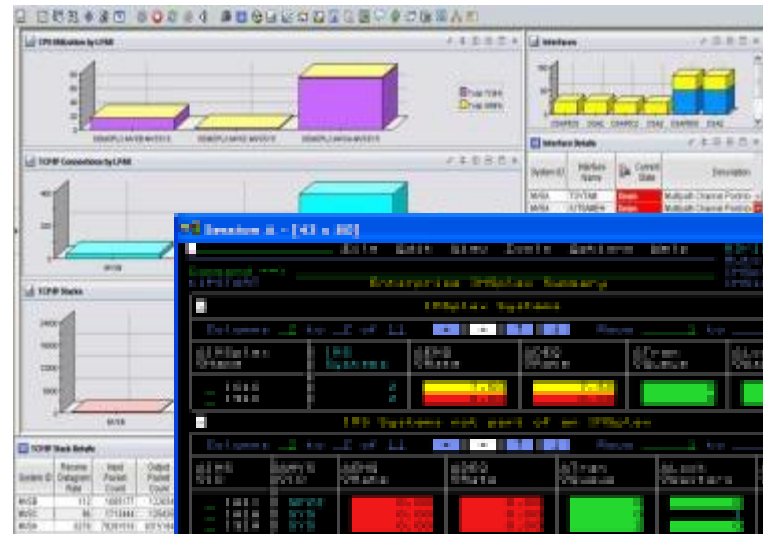
Why incorporate insights from zAware with OMEGAMON?

OMEGAMON already provides a complete set of Performance Monitoring capabilities for z/OS, z/OS middleware, applications, etc.

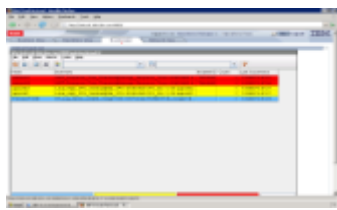
- Pro-Active Performance Monitoring (z/OS, CICS, IMS, DB2, Mainframe Networks, Storage, etc)
- Generate EIF Events (OMNIbus, etc)
- Automation



Status	Situation Name	Display Item	Source	Impact
Problem	Linux_Packets_Error		sles9094 LZ	Network
Problem	Linux_RPC_Bad_Calls		sles9094 LZ	Process
Problem	Linux_Process_High_Cpu		sles9094 LZ	Process
Problem	Linux_Packets_Error		sles9096 LZ	Network
Problem	Linux_RPC_Bad_Calls		sles9096 LZ	Process
Problem	Linux_Process_High_Cpu		sles9096 LZ	Process
Open	NT_Log_Space_Low	Security	PrimaryHODNT2NT	System
Open	NT_Log_Space_Low	Application	PrimaryHODNT2NT	System
Open	IMS_MQ_Connection_Status		BMSA MVSA IMS	IMS MQSeries Status
Open	IMS_MQ_Connection_Status		BMST MVSA IMS	IMS MQSeries Status
Open	N3T_CPU_Pct_Warning		TCPIP.MVSA	Address Space
Open	KHL_AddressSpace_Waiting		DEMOPLEX.MVSA.AVAILABILITY	Address Space Data
Problem	Linux_High_Packet_Collisions		sles9094 LZ	Network
Problem	Linux_Process_stopped		sles9094 LZ	Process
Problem	Linux_System_Thrashing		sles9094 LZ	System Information
Problem	Linux_High_Packet_Collisions		sles9096 LZ	Network
Problem	Linux_Process_stopped		sles9096 LZ	Process
Problem	Linux_System_Thrashing		sles9096 LZ	System Information
Open	N3T_Conn_Rnd_Trip_Time		TCPIP.MVSA	Connections
Open	MQSeries_MQ_Channel_Stopped		WMQAMVSA.MQESA	MQSeries Events
Open	DNET556_Disk_High_RespTime		CXEGAD1 MVSA.STORAGE	Storage Subsystem
Open	KHL_High_Severity_Check		DEMOPLEX.MVSA.HEALTHCHECK	Health Monitor Chec



IBM zAware, Event Management & Traditional Performance Monitoring



View event in Active Event List
Generate trouble ticket



Operator, SME



Perform PD for with correlation to traditional monitoring KPIs

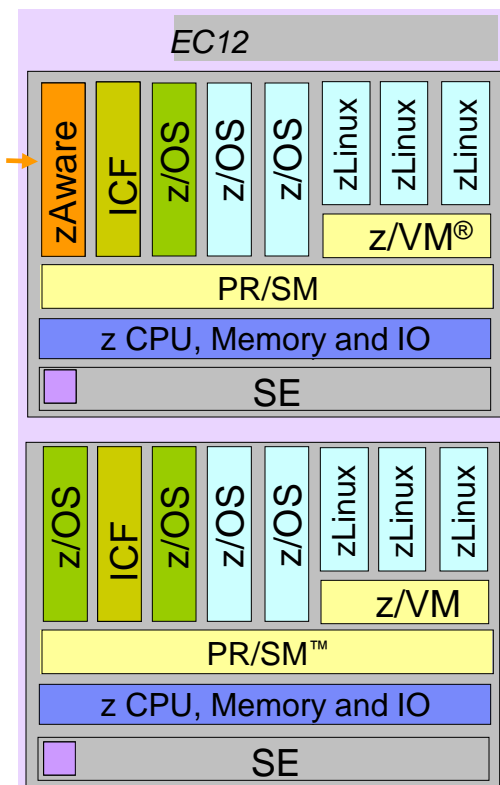
Proposed Future Capability



Processing ...

- Query zAware (10 minute interval)
- If anomaly detected
 - Trigger situation to Generate Event when anomaly is surfaced
- Include zAware insights in performance monitoring views

- Performance monitoring scenarios currently being developed per Tivoli's statement of direction
- Customer input welcome



Performance monitoring view including IBM zAware anomalies

Proposed Future Capability

Anomaly scores for the last hour

zAware server info

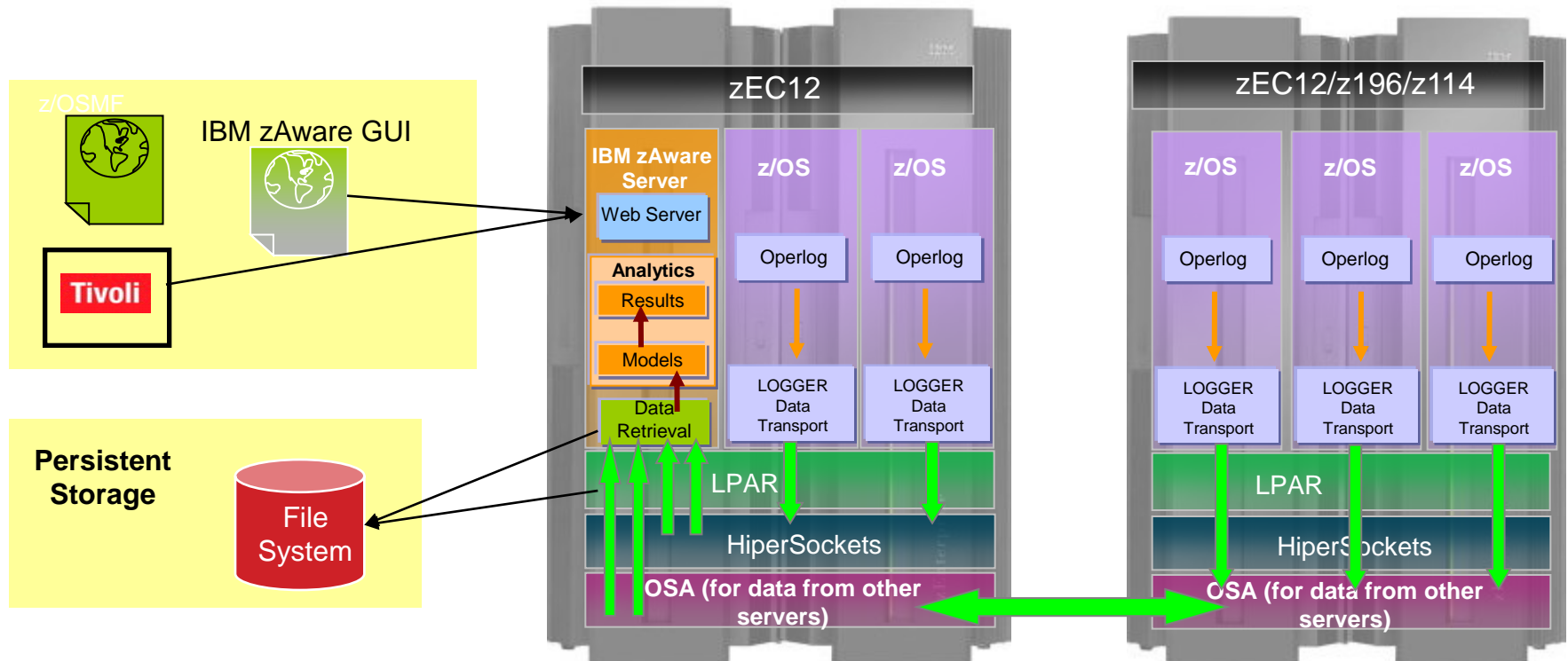
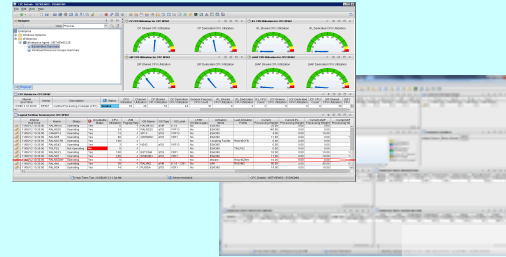
Trigger situations to generate events based on anomaly score

Reduce MTRR

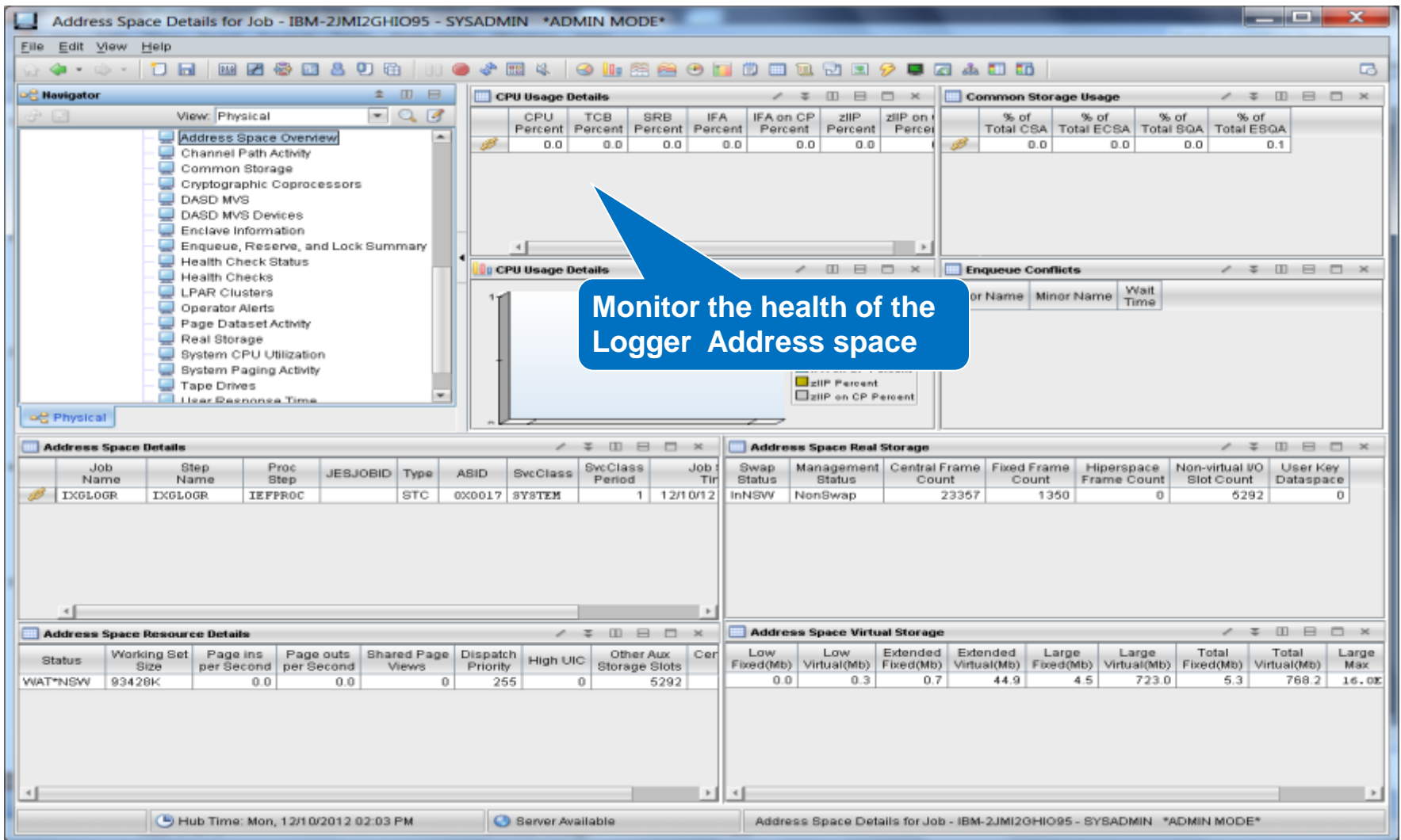
Monitor the Components of the IBM zAware environment

Tivoli Performance Monitoring

- IBM zAware Server
- Network (HiperSockets & OSA)
- z/OS Logger
- Storage



IXGLOGR Address Space Details



Monitor the health of the Logger Address space

CPU Percent	TCB Percent	SRB Percent	IFA Percent	IFA on CP Percent	zIIP Percent	zIIP on CP Percent
0.0	0.0	0.0	0.0	0.0	0.0	0.0

% of Total CSA	% of Total ECSA	% of Total SQA	% of Total ESQA
0.0	0.0	0.0	0.1

Job Name	Step Name	Proc Step	JESJOBID	Type	ASID	SvcClass	Svc Class Period	Job Time
IXGLOGR	IXGLOGR	IEFPROC		STC	0X0017	SYSTEM	1	12/10/12

Swap Status	Management Status	Central Frame Count	Fixed Frame Count	Hiperspace Frame Count	Non-virtual I/O Slot Count	User Key Dataspace
InNSW	NonSwap	23357	1350	0	5292	0

Low Fixed(Mb)	Low Virtual(Mb)	Extended Fixed(Mb)	Extended Virtual(Mb)	Large Fixed(Mb)	Large Virtual(Mb)	Total Fixed(Mb)	Total Virtual(Mb)	Large Max
0.0	0.3	0.7	44.9	4.5	723.0	5.3	768.2	16.0K

Hub Time: Mon, 12/10/2012 02:03 PM | Server Available | Address Space Details for Job - IBM-2JMI2GHIO95 - SYSADMIN *ADMIN MODE*

zEnterprise Ensemble Summary workspace



CPC Details - NETVIEW03 - SYSADMIN

File Edit View Help

Navigator

View: Physical

- Enterprise
 - Windows Systems
 - zEnterprise
 - zEnterprise
 - Physical

CP CPU Utilization for CPC RP567

CP Shared CPU Utilization

CP Dedicated CPU Utilization

IFL CPU Utilization for CPC RP567

IFL Shared CPU Utilization

IFL Dedicated CPU Utilization

zIIP CPU Utilization for CPC RP567

zIIP Shared CPU Utilization

zIIP Dedicated CPU Utilization

zAAP CPU Utilization for CPC RP567

zAAP Shared CPU Utilization

zAAP Dedicated CPU Utilization

CPC Details for CPC RP567

Interval End Time	Name	Description	Status	CPU Utilization	Channel Utilization	CP Shared CPU Utilization	CP Dedicated CPU Utilization	General Purpose CPU Count	IFL Shared CPU Utilization	IFL Dedicated CPU Utilization	IFL CPU Count	ICF Shared CPU Utilization	ICF Dedicated CPU Utilization	ICF CPU Count	zIIP Shared CPU Utilization	zIIP CPU Count
11/06/12 10:30:00	RP567	Central Processing Complex (CPC)	Service	63	26	53	44	91	0	0	2	0	0	0	0	29

Logical Partition Summary for CPC RP567

Interval End Time	Name	Status	Acceptable Status	CPU Utilization	zVM Paging Rate	OS Name	OS Type	OS Level	OS M	ESA3	Current zIIP Processing We
11/06/12 10:30:00	RALVMTS1	Operating	Yes	0	-1	RALVMTS1	zVM	6.1.0	No		0.00
11/06/12 10:30:00	RALNS20	Operating	Yes	24	-1	RALNS20	zIOS	V1R13	No		0.00
11/06/12 10:30:00	CANSP13	Operating	Yes	13	-1	SP13	zIOS	V1R13	No		0.00
11/06/12 10:30:00	RALNS5	Operating	Yes	98	-1	GERMANY	zIOS	V2R1	No	ESA3	10.00
11/06/12 10:30:00	RALNSCFB	Operating	Yes	100	-1				No	Coup	0.00
11/06/12 10:30:00	RALNS42	Operating	Yes	3	-1	NS42	zIOS	V1R13	No	ESA3	0.00
11/06/12 10:30:00	TIVLP52	Not Operating	No	0	-1				No	ESA3	0.00
11/06/12 10:30:00	RALNS23	Operating	Yes	100	-1	ESTONIA	zIOS	V2R1	No	ESA3	10.00
11/06/12 10:30:00	RALNS7	Operating	Yes	100	-1	SWEDEN	zIOS	V2R1	No	ESA3	10.00
11/06/12 10:30:00	RALNSZAW	Operating	Yes	0	-1				No	zAware	0.00
11/06/12 10:30:00	RALVM2	Operating	Yes	38	-1	RALVM2	zVM	6.1.0 - 1201	No	zVM	50.00
11/06/12 10:30:00	RALNS4	Operating	Yes	74	-1	RUSSIA	zIOS	V2R1	No	ESA390	10.00

Proposed Future Capability

Monitor the IBM zAware partition Running in the EC12

Hub Time: Tue, 11/06/2012 11:04 AM
Server Available
CPC Details - NETVIEW03 - SYSADMIN



IBM zAware Share Presentations

Session # 13063:

IBM zAware - Using Analytics to Improve System z Availability

Speaker: Garth Godfrey

Session # 13066:

Setting up IBM zAware - Step by Step

Speakers: Garth Godfrey and Thomas B. Mathias

IBM zAware and Tivoli – more Information

IBM zAware Publications:

System z Advanced Workload Analysis Reporter (IBM zAware) Guide - SC27-2623-00

[https://www-](https://www-304.ibm.com/support/docview.wss?uid=isg24f9114255d7d1f3285257a6a0077c2ca&aid=1)

[304.ibm.com/support/docview.wss?uid=isg24f9114255d7d1f3285257a6a0077c2ca&aid=1](https://www-304.ibm.com/support/docview.wss?uid=isg24f9114255d7d1f3285257a6a0077c2ca&aid=1)

IBM zAware Demo:

https://www-304.ibm.com/connections/blogs/systemz/entry/zawaredemo?lang=en_us

IBM zAware Redbook:

Extending z/OS System Management Functions with IBM zAware

<http://www.redbooks.ibm.com/abstracts/sg248070.html?Open>

Service Management Connect:

NetView wiki page to download zAware integration samples and documentation

<https://www.ibm.com/developerworks/mydeveloperworks/wikis/home?lang=en#/wiki/Tivoli%20System%20z%20Monitoring%20and%20Application%20Management/page/Integration%20Scenarios%20for%20Tivoli%20NetView%20for%20zOS>

IBM zAware and Tivoli – Service Management Myth Buster #199

https://www.ibm.com/developerworks/mydeveloperworks/blogs/5e65990a-9690-42e2-93b1-c2267be7620c/entry/service_management_myth_busters1?lang=en

System z Social Media Channels

- Top Facebook pages related to System z:

- [IBM System z](#)
- [IBM Academic Initiative System z](#)
- [IBM Master the Mainframe Contest](#)
- [IBM Destination z](#)
- [Millennial Mainframer](#)
- [IBM Smarter Computing](#)

- Top LinkedIn groups related to System z:

- [System z Advocates](#)
- [SAP on System z](#)
- [IBM Mainframe- Unofficial Group](#)
- [IBM System z Events](#)
- [Mainframe Experts Network](#)
- [System z Linux](#)
- [Enterprise Systems](#)
- [Mainframe Security Gurus](#)

- Twitter profiles related to System z:

- [IBM System z](#)
- [IBM System z Events](#)
- [IBM DB2 on System z](#)
- [Millennial Mainframer](#)
- [Destination z](#)
- [IBM Smarter Computing](#)

- YouTube accounts related to System z:

- [IBM System z](#)
- [Destination z](#)
- [IBM Smarter Computing](#)

- Top System z blogs to check out:

- [Mainframe Insights](#)
- [Smarter Computing](#)
- [Millennial Mainframer](#)
- [Mainframe & Hybrid Computing](#)
- [The Mainframe Blog](#)
- [Mainframe Watch Belgium](#)
- [Mainframe Update](#)
- [Enterprise Systems Media Blog](#)
- [Dancing Dinosaur](#)
- [DB2 for z/OS](#)
- [IBM Destination z](#)
- [DB2utor](#)



Questions