



Discovery, monitoring and automation for IBM zEnterprise ensemble

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Cloud and Smarter Infrastructure System z Development

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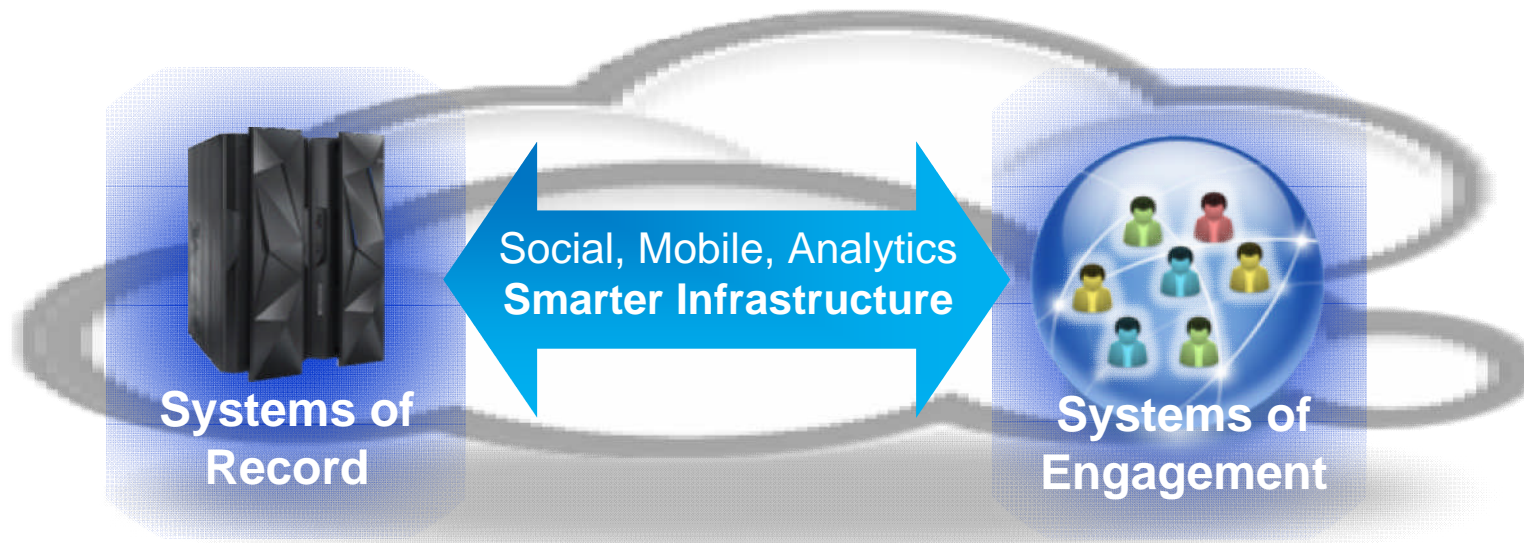
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Rapid growth of next generation technologies supported seamlessly on zEnterprise

System z scaling model and security to manage and optimize both



- Business Transactions
- Quality of Service
- Command & Control
- Facts and data “source of truth”
- z/OS

- Mobile and Social
- Dynamic
- Interactions and Collaboration
- Insight, trends, analytics
- Linux on System z
- xBX



IBM zEnterprise Systems – Best in Class Systems and Software



Unified management for a smarter system: **zEnterprise Unified Resource Manager**

The world's fastest and most scalable system:
IBM zEnterprise™ EC12 (zEC12)
IBM zEnterprise™ 196 (z196)
or zEnterprise™ 114 (z114)

- Unifies management of resources, extending IBM System z® qualities of service end-to-end across workloads
- Provides hardware, platform, and workload management
- Provides APIs to enable management of Unified Resource Manager from external tools

Scale out to a trillion instructions per second:
IBM zEnterprise BladeCenter® Extension (zBX)

- Ideal for large scale data and transaction serving and mission critical applications
- Most efficient platform for Large-scale Linux® consolidation
- Leveraging a large portfolio of z/OS® and Linux on System z applications
- Capable of massive scale up

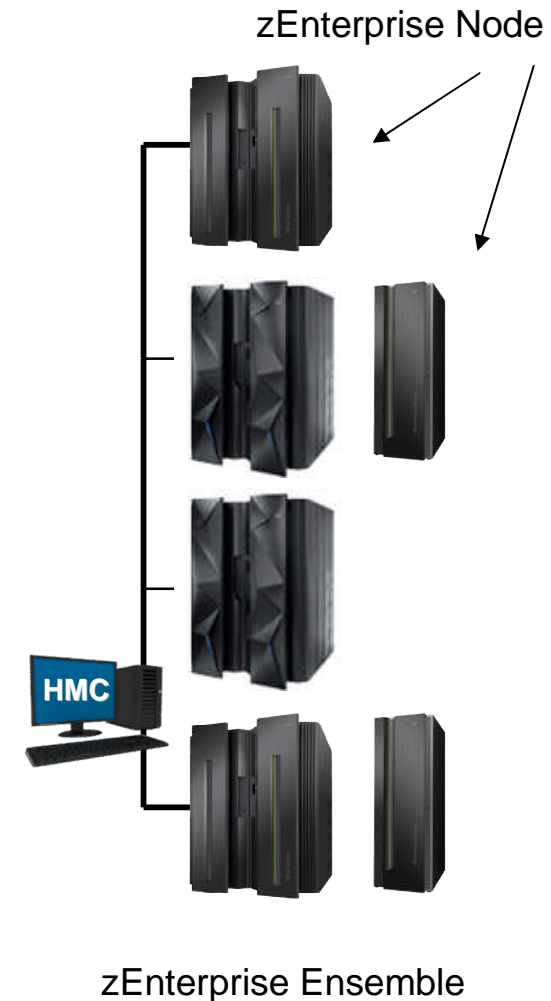


- Select IBM POWER7® blades and IBM System x® blades for tens of thousands of AIX®, Linux and Windows applications
- High performance optimizers and appliances to accelerate time to insight and reduce costs
- Dedicated high performance private network



zEnterprise Ensemble

- A zEnterprise ensemble is a collection of 1 to 8 zEnterprise nodes
- A zEnterprise node is a zEC12, z196 or z114 CPC with 0 to 4 racks, up to 2 BladeCenters per rack, and up to 112 blades in total
- A zEnterprise node can be a member of at most one ensemble
- Managed collectively by the Unified Resource Manager as a single logical virtualized system

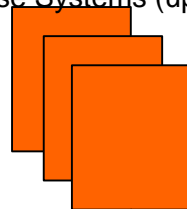




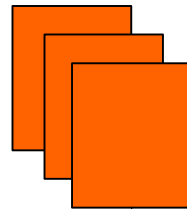
Workload Resource Group in the zEnterprise Context

What is it?

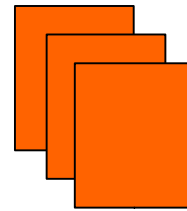
- Workload Resource Group in the zEnterprise context is the collection of virtual servers, storage, networking and hardware resources that are defined within the zManager at creation.
- Workloads Resource Groups can span LPARs, blades, and even zEnterprise Systems (up to eight) .



x86/
KVM

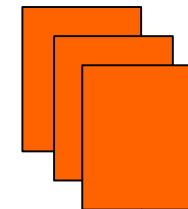


Power7/
PowerVM

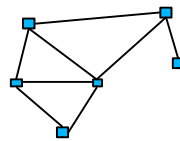


z/VM

**Workload
Resource Group**



LPAR



Network



Policy



Storage

What is the value proposition?

- By following this construct customers can begin to move beyond the management of resources and components of services.
- Workload management enables the alignment of until now disparate resources to goals and priorities at the level that delivers business value.

Service classes

- Service classes define performance goals for virtual servers in the workload
- Service classes define the Business Importance and target performance goal

Performance policies

- A Performance Policy is associated with a Workload.
- zManager will dynamically adjust CPU settings to achieve performance policy compliance.



Tivoli support of zEnterprise APIs increase value of managing virtualized workloads



New API support intends to increase ability to provide visibility, control and automation across the zEnterprise



Prior to zEnterprise:

Ability to manage current infrastructure based at an Operating System level with associated middleware and applications across heterogeneous environments

Today:

Ability to manage virtualized workloads across operating environments on zEC12/z196/z114 and zBX based on business rules

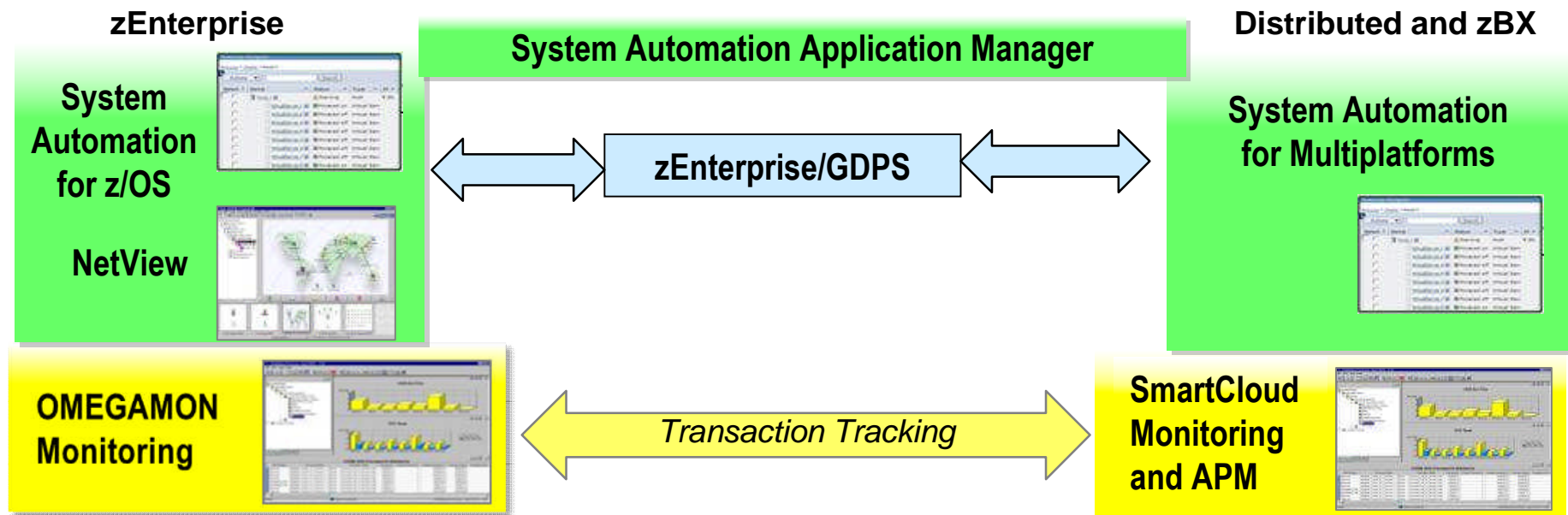


Only IBM monitoring and automation seamlessly support entire enterprise, including cloud, mobile and big data

IBM end-to-end visibility, control and automation, including high availability

Systems of Record

Systems of Engagement

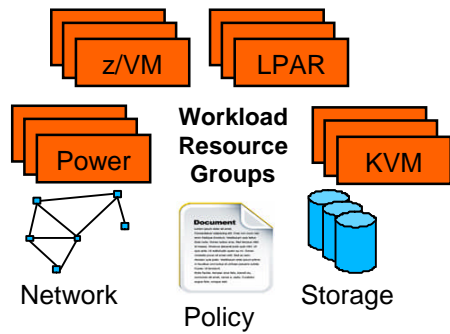
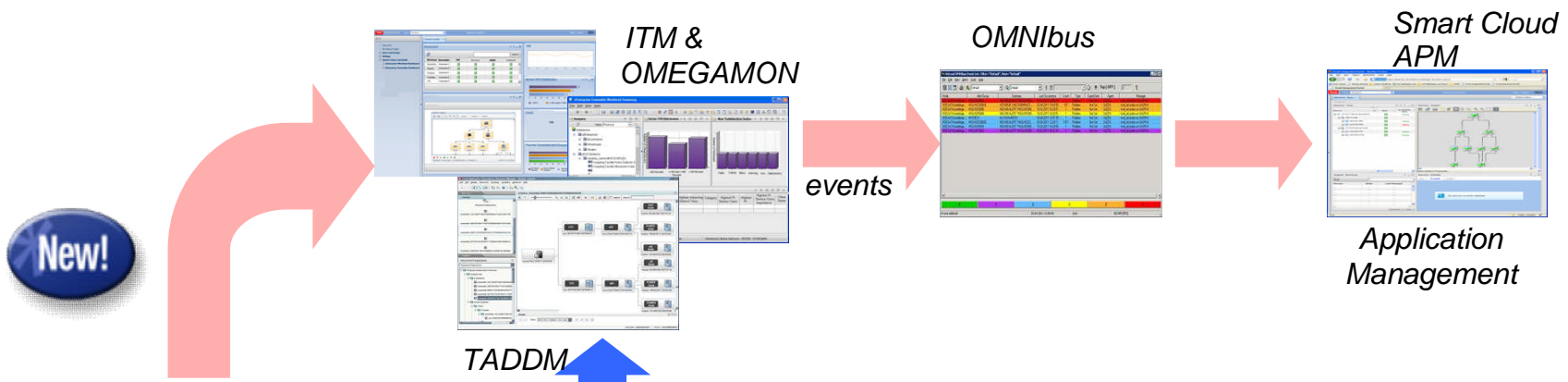


Benefits:

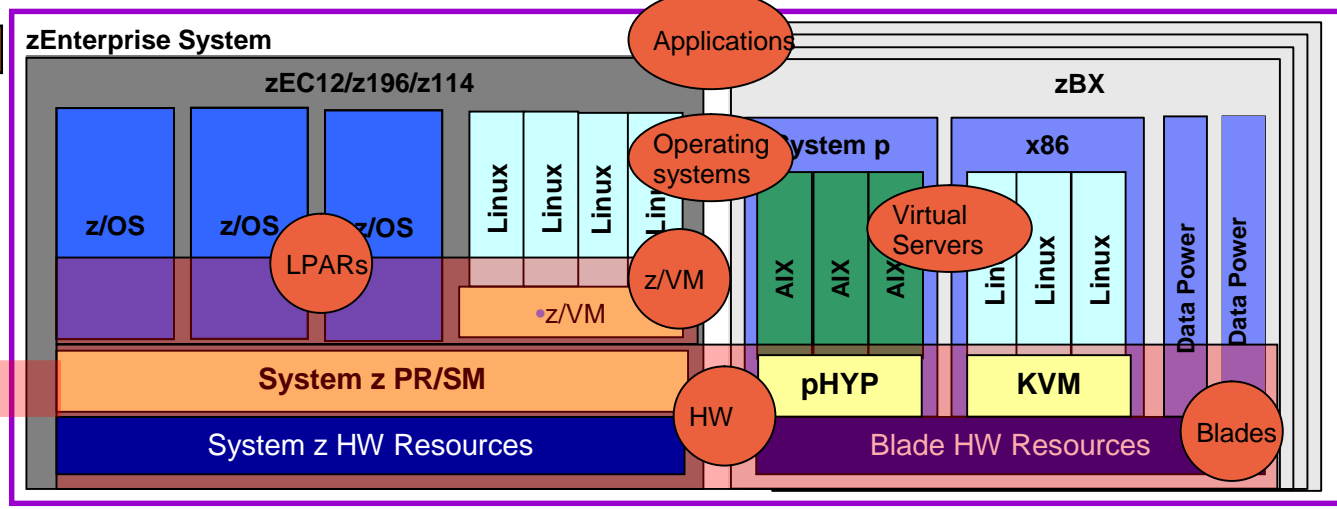
Ensure resiliency and availability of critical business workloads with recovery time objective of less than one minute



Monitoring, Discovery and Application Management



Existing operating system, middleware, application monitoring agents and discovery sensors

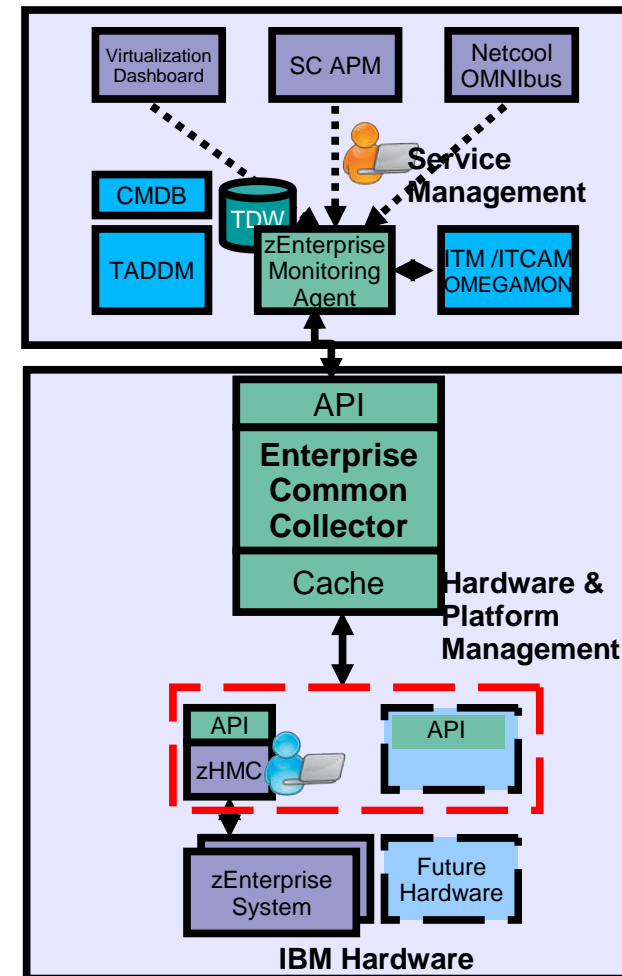
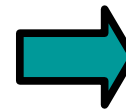




Role and Value of the Enterprise Common Collector

Enterprise Common Collector

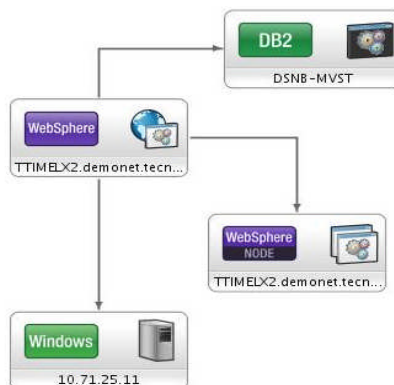
- Serves as a proxy for all IBM products interested in IBM zEnterprise Monitoring and Discovery data
- Can be single instance in an enterprise
 - Scales easily to include additional zEnterprise systems with little or no configuration changes
- Reduces configuration effort
- Avoids multiple similar requests targeted for a single zEnterprise ensemble
- Consistent reporting across products
- Is positioned as a common collector for other future hardware components also



Tivoli Application Dependency Discovery Manager (TADDM)

Universal Discovery Engine

Discovers configuration items and their Actual State. Includes Topology Views and the ability to **discover relationships** between items. **Name Reconciliation And Normalization** of data



Application Mapping with Dependencies

Customer can understand what they have through **discovery of interdependencies** between applications, middleware, servers and network components and automated application maps

Configuration Auditing

Shows how configuration items are **configured and changing over time** by capturing the configuration of each CI, tracking changes to it and providing analytics to report on the **history of these configuration changes** over time

Type	Component	Change	Date	Attribute	Old	New
LPAR	ZTECCVM	Updated	Monday, June 4, 2011 9:58:09 PM EST	label	ZTECCVM	ZTECCVM P2097
LPAR	ZTECCVM P2097	Updated	Tuesday, June 7, 2011 12:42:20 AM EST	name	ZTECCVM	9-BM-2097-00000000000000000000
LPAR	ZTECCVM P2097	Updated	Tuesday, June 7, 2011 12:42:20 AM EST	sourceToken	9-P2097-LPAR	9-P2097-VCSLPAR
LPAR	ZTECCVM P2097	Updated	Tuesday, June 7, 2011 12:42:20 AM EST	sourceToken	9-P2097-VCSLPAR	9-P2097-LPAR
LPAR	ZTECCVM P2097	Updated	Wednesday, June 8, 2011 10:00:24 PM EST	hostSystem	P2097	P2097
LPAR	ZTECCVM P2097	Updated	Saturday, June 11, 2011 9:24:18 AM EST	label	ZTECCVM P2097	ZTECCVM
LPAR	ZTECCVM	Updated	Saturday, June 11, 2011 9:34:17 AM EST	name	9-BM-2097-00000000000000000000	ZTECCVM
LPAR	ZTECCVM	Updated	Saturday, June 11, 2011 9:41:18 PM EST	hostSystem	P2097	P2097
LPAR	ZTECCVM	Updated	Saturday, June 18, 2011 12:15:31 AM EST	hostSystem	P2097	P2097

Compliance

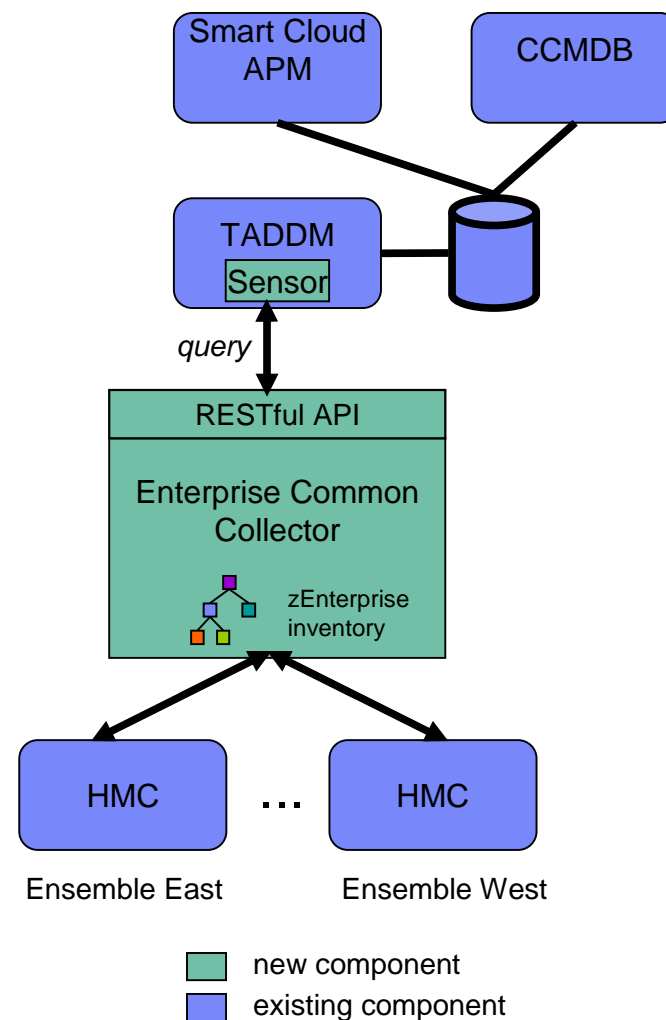
Determines if configuration items are **compliant** by using the capability to compare discovered configuration of CIs to a "reference configuration" and determine the variations that define violations to local policy

TADDM is Tivoli's discovery tool and provides visibility to what a client has, how it is configured, and how it is changing over time.



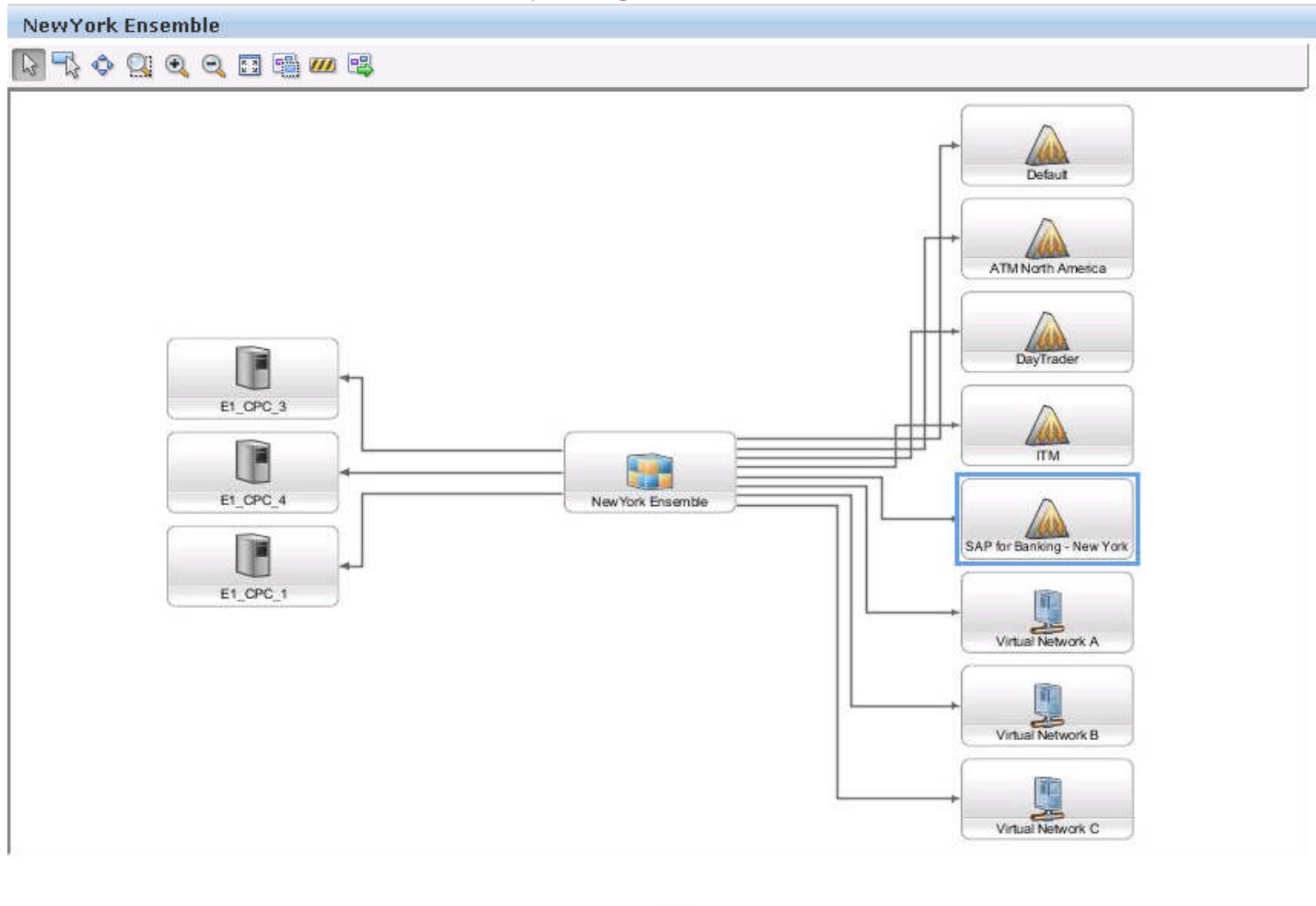
Discovery

- TADDM sensor uses collector API to discover and visualize objects, some of which are only visible at the HMC (examples: blades, workloads)
 - Configure ONE sensor per enterprise
 - Single data source per enterprise – the Enterprise Common Collector
- TADDM visualizes dependencies, for example
 - Virtual servers in a workload
 - Virtual servers in the same virtual network
 - Storage resources a virtual server is depending on
 - Virtual servers location (zBX, blade, ...)
- TADDM sensor serves as the discovery engine for CCMDB
 - Identify zEnterprise configuration changes
- Smart Cloud APM
 - Correlate business applications to workloads



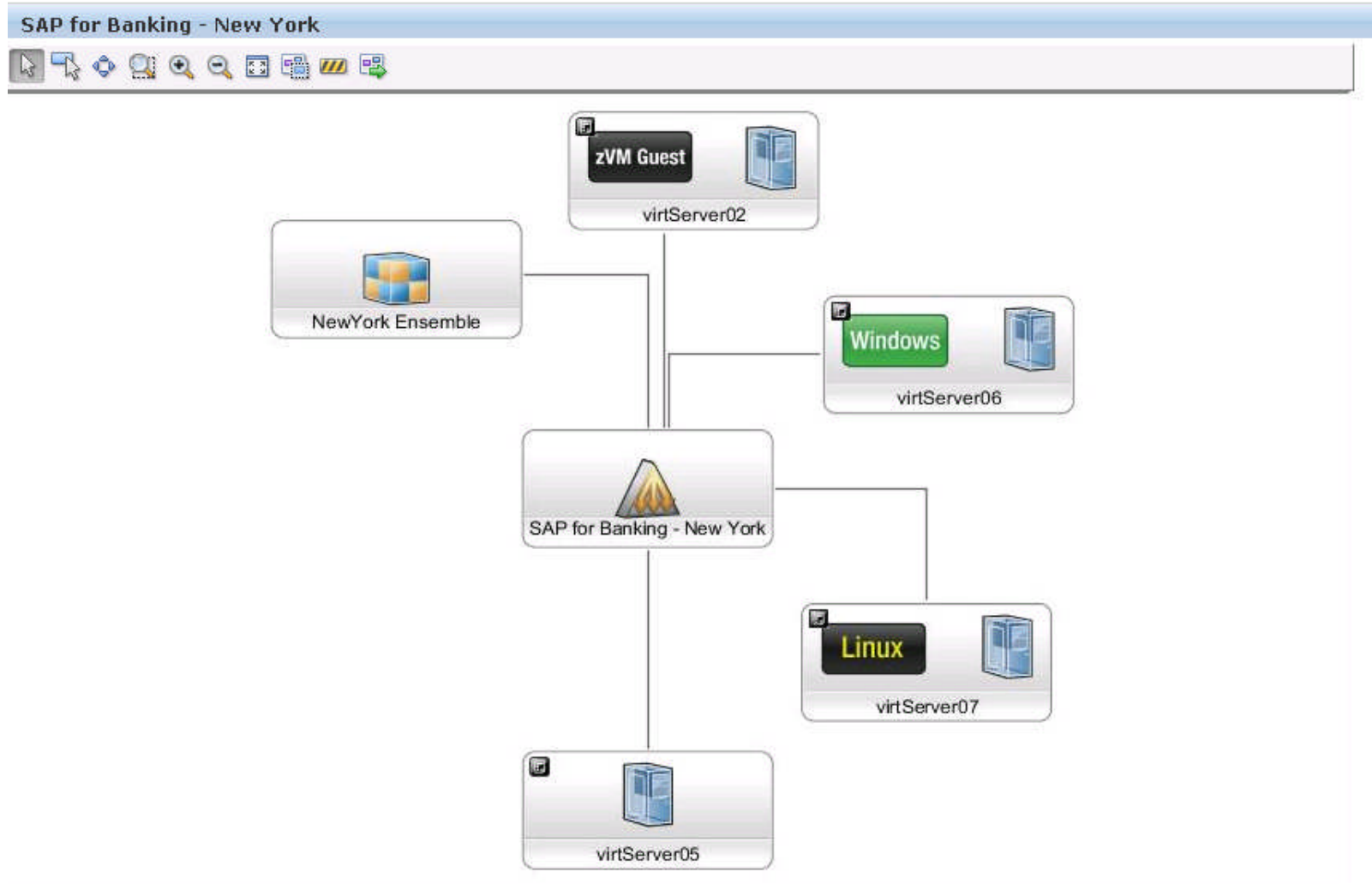


TADDM Universal Discovery Engine and Reconciliation





TADDM Workload Resource Group Resource Mapping





TADDM Configuration Audition

- Tracks changes in applications
- Depicts that information on the map
- Depicts that information thru reports

Automatically tracks changes on all attribute values over time...

Type	Component	Change	Date	Attribute	Old	New
WorkloadResource	Default::Default	Member added	Wednesday, March 28, 2012 3:38:45 PM Central Daylight Time	policies		perfPol01wE1
WorkloadResource	Default::Default	Member deleted	Wednesday, March 28, 2012 3:38:45 PM Central Daylight Time	policies	perfPol01wE4	
WorkloadResource	Default::Default	Updated	Wednesday, March 28, 2012 3:38:45 PM Central Daylight Time	description	Default Workload on New York Ensemble	DayTrader Workload on New York Ensemble
			Wednesday, March 28, 2012			



TADDM Compliance

Compare configuration to “reference master”
 –Compare to your standard policy

Comparing two instances of a DB2 Subsystem to the reference master

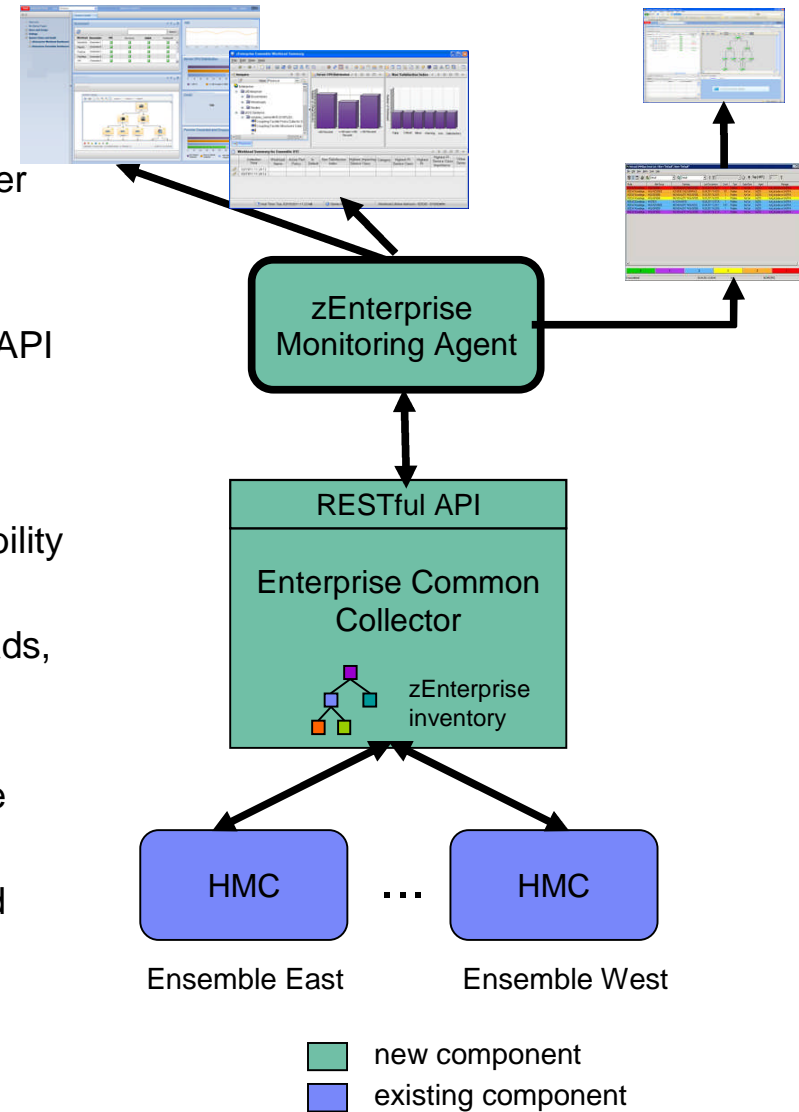
Values in red and blue are policy violations

#	DSNA-MVST - Version: 0	DB1S-MVST - Version: 0	DSNB-MVST - Version: 0
Database Maximum Altered Time Stamp	12/2/09 08:41 CDT	12/9/09 15:37 CDT	12/2/09 09:05 CDT
Config Contents			
Tablespaces			
Source Token	DSNA-MVST-DB2Subsystem-Tablespaces-AppConfig	DB1S-MVST-DB2Subsystem-Tablespaces-AppConfig	DSNB-MVST-DB2Subsystem-Tablespaces-AppConfig
Content			
Source Token	DSNA-MVST-DB2Subsystem-Tablespaces-ZReportFile	DB1S-MVST-DB2Subsystem-Tablespaces-ZReportFile	DSNB-MVST-DB2Subsystem-Tablespaces-ZReportFile
Checksum	867999802	738890175	840676648
Label	DSNA-MVST-DB2Subsystem-Tablespaces	DB1S-MVST-DB2Subsystem-Tablespaces	DSNB-MVST-DB2Subsystem-Tablespaces
Databases			
Source Token	DSNA-MVST-DB2Subsystem-Databases-AppConfig	DB1S-MVST-DB2Subsystem-Databases-AppConfig	DSNB-MVST-DB2Subsystem-Databases-AppConfig
Content			



Monitoring

- **Free with ITM!**
- Install/Configure ONE zEnterprise Monitoring Agent per enterprise
- Runs on Linux for z and x, AIX, Windows
- zEnterprise Monitoring Agent uses common collector API for initial discovery of resources and to collect performance metrics per collection interval
- HMC notifications keep the collector's inventory up to date, enabling automatic monitoring and update capability in TADDM/CMDB
- Monitored zEnterprise resources (ensembles, workloads, virtual servers, network, storage, policy) visualized on Dashboards and workspaces.
- Situation processing generates events when SLAs are not being met
- Historical reports available for capacity planning, trend analysis and problem determination (Cognos)
- Event management (OMNIbus) with correlation to applications (Smart Cloud APM)





Example Flow: Workload Resource Groups Summary (1/3)

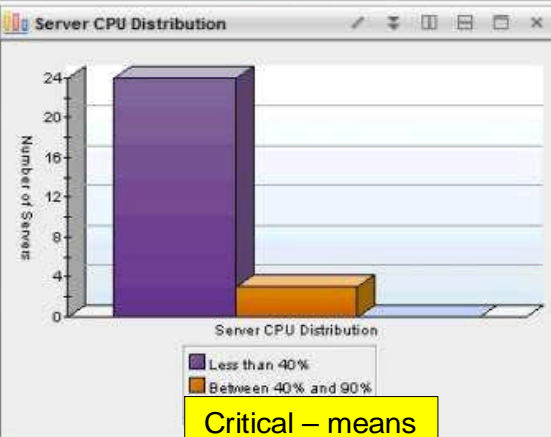
Workload Resource Groups Summary - IBM-0X6CTF15S7A - SYSADMIN *ADMIN MODE*

File Edit View Help

Navigator View: Physical

- Enterprise
 - zEnterprise
 - zEnterprise Agent - IBM-0X6CTF15S7A:ZE
 - Ensembles Summary
 - Workload Resource Groups Summary**

Link used to quickly navigate for more detail



Critical – means Service levels are being missed

Interval End Time	Name	Default Workload	Ensemble Name	Category	Workload Service Level Index	High S	High Servi
11/18/11 16:22:00	ATM Europe	No	London Ensemble	Banking	Fatal	ServiceClassF1-V	perfPol01wF
11/18/11 16:22:00	SAP for Banking - New York	No	NewYork Ensemble	SAP	Critical	ServiceClassC3-V	perfPol01wC
11/18/11 16:22:00	ATM Asia	No	Mumbai Ensemble	Banking	Minor	Default	perfPol01wK
11/18/11 16:22:00	SAP Banking Mumbai	No	Mumbai Ensemble	SAP	Minor	Default	perfPol01wJ
11/18/11 16:22:00	Call Center	No	Mumbai Ensemble	Operations	Minor	Default	perfPol01wI
11/18/11 16:22:00	SAP for Banking - Tokyo	No	Tokyo Ensemble	SAP	Minor	ServiceClassD1-V	perfPol01wD
11/18/11 16:22:00	CRM	No	London Ensemble	Operations	Minor	ServiceClassE2-V	perfPol01wE
11/18/11 16:22:00	Test Workload	No	Mumbai Ensemble	Development	Minor	Default	perfPol01wH
11/18/11 16:22:00	Development Workload	No	London Ensemble	Development	Minor	ServiceClassF1-V	perfPol01wF
11/18/11 16:22:00	ATM North America	No	NewYork Ensemble	Banking	Warning	ServiceClassC1-V	perfPol01wC2
11/18/11 16:22:00	Online Accounts	No	Shanghai Ensembl	Operations	Informational	ServiceClassG1-V	perfPol01wG
11/18/11 16:22:00	Default	Yes	Mumbai Ensemble	Default	Satisfactory	Default	perfPol01wE5
11/18/11 16:22:00	Default	Yes	Shanghai Ensembl	Default	Satisfactory	Default	perfPol01wE4



Example Flow: Workload Resource Group details (2/3)

Server CPU Distribution

Category	Number of Servers
Less than 40%	2
Between 40% and 90%	1
Greater than 90%	0

Workload Service Level Index

Time	Workload Service Level Index
11/18/11 16:30:00	~5.5
11/18/11 16:50:00	~5.5
11/18/11 17:10:00	~5.5

Workload Resource Group Details - IBM-0X6CTF15S7A - SYSADMIN *ADMIN MODE*

Interval End Time	Active Performance Policy	Performance Policy Activation Node Count	Performance Policy Activation Status	Workload Service Level Index	Highest Impacting Service Class	Category	Highest PI Service Class	Highest PI	Service
11/18/11 16:22:00	perfPol01wC	2	Active	Critical	ServiceClassC3-V	SAP	ServiceClassC3-V	1.29	High

Performance Policy perfPol01wC for Workload Resource Group SAP for Banking - New York

Name	Default Policy	Importance	Activation Status	Default Service Class	Last Activation Requested Date	Last Activation Completed Date	Last Activated By	Last Modified Date	Last Modified By	Created Date
perfPol01wC	The display name specified for the performance policy	fault		fault	02/25/11 14:42:14	02/25/11 14:42:14	PEDEBUB	02/25/11 14:42:14	PEDEBUB	02/25/11 14:42:14

Service Classes in Performance Policy perfPol01wC for Wor...

Name	Description	Business Importance	Performance Index	Type	Virtual Server Name	Virtualization Host Name	Platform Type	Status	Acceptable Status	GP
ServiceClassC3-V	Ve	1.29	1.29	Server	virtServer10	virtHost04	PowerVM	Operating	Yes	Operati
ServiceClassC1-V	Ve	0.5	0.5	Server	virtServer06	virtHost03	x Hyp	Operating	Yes	Operati
ServiceClassC2-V	Ve	0.67	0.67	Server	virtServer07	virtHost03	x Hyp	Operating	Yes	Operati
					virtServer02	virtHost01	z/VM	Operating	Yes	Operati

Virtual Servers for Workload Resource Group SAP for bankl...

Name	Description	Business Importance	Performance Index	Type	Virtual Server Name	Virtualization Host Name	Platform Type	Status	Acceptable Status	GP
virtServer10				Server	virtServer10	virtHost04	PowerVM	Operating	Yes	Operati
virtServer06				Server	virtServer06	virtHost03	x Hyp	Operating	Yes	Operati
virtServer07				Server	virtServer07	virtHost03	x Hyp	Operating	Yes	Operati
virtServer02				Server	virtServer02	virtHost01	z/VM	Operating	Yes	Operati



Example Flow: Virtual Server details (3/3)

The screenshot displays the 'PowerVM Virtual Server Details' window for 'IBM-0X6CTF15S7A - SYSADMIN *ADMIN MODE*'. It features a Navigator pane on the left, a central area with two charts, and three data tables at the bottom.

CPU Utilization and Delay for Virtual Server: A line chart showing CPU Utilization (blue) at 80% and Virtualization Host CPU Delay (%) (orange) at 20% over time.

Packets Discarded and Dropped: A bar chart showing network statistics for various packet types.

PowerVM Virtual Server CPU and Memory Details for Virtual Server virtServer10:

Interval End Time	TCP/IP Hostname	Status	Acceptable Status	CPU Utilization	Virtualization Host CPU Delay (%)	Current Processing Units	Memory Utilization	Current Memory (MB)	Sampling Rate	Process Mode
11/18/11 16:22:00	virtServer10.virtHost04.ibm.com	Operating	Yes	80	20	1.00	90	1024	0	Shared

PowerVM Virtual Server Network Statistics for Virtual Server virtServer10:

Bytes Sent	Bytes Received	Packets Sent	Packets Received	Packets Sent Dropped	Packets Received Dropped	Multicast Packets Sent	Multicast Packets Received	Br Pac
0	0	0	0	0	0	0	0	0

Workload Resource Groups Summary for Virtual Server virtServer10:

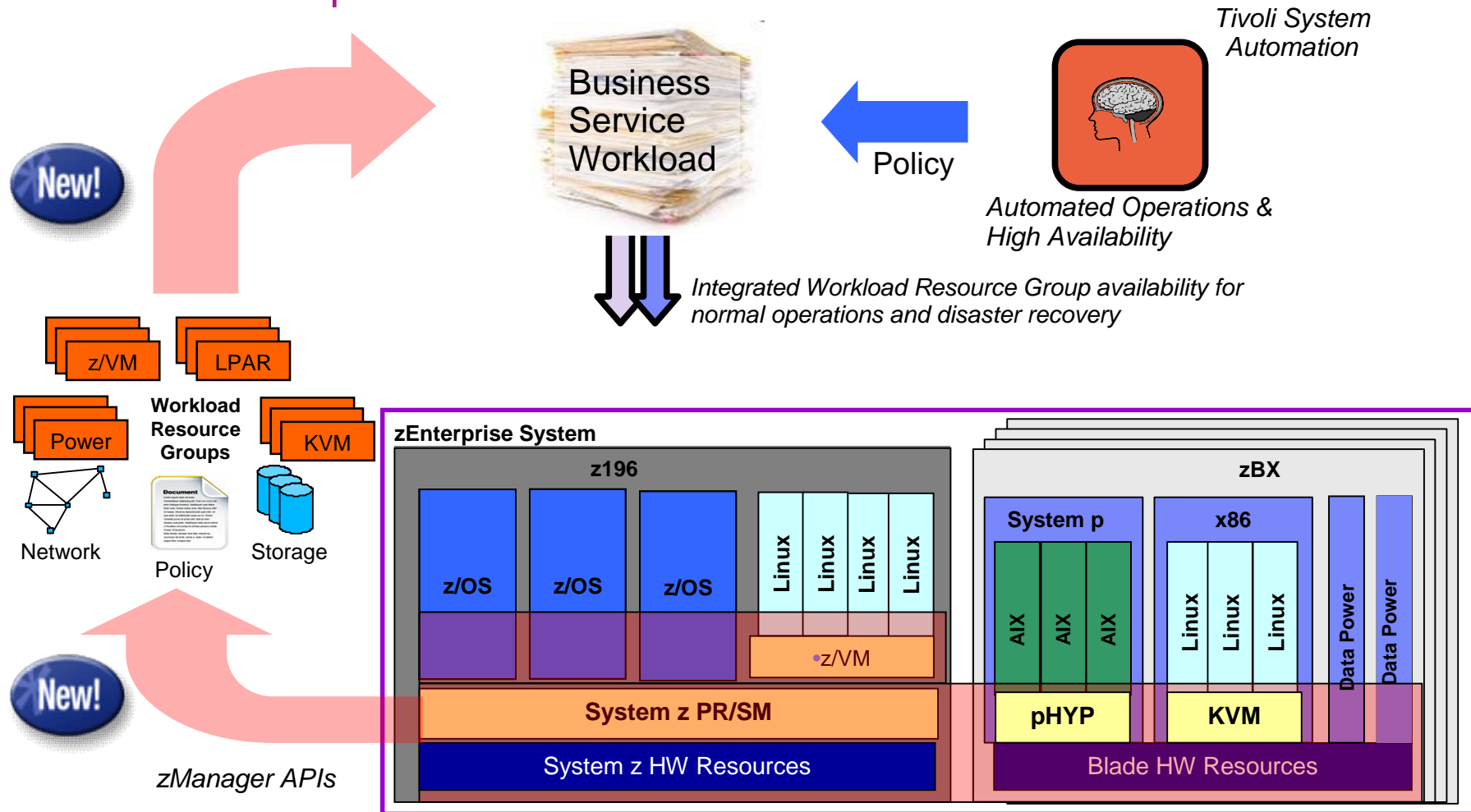
Interval End Time	Workload Name	Service Class of Virtual Server	Workload Service Level Index	Highest Impacting Service Class	Active Performance Policy	Highest PI Service Class	Highest PI	Servi
11/18/11 16:22:00	SAP for Banking - New York	ServiceClassC3-V	Critical	ServiceClassC3-V	perfPol01wC	ServiceClassC3-V	1.29	High
11/18/11 16:22:00	DayTrader	ServiceClassA2-D	Satisfactory	ServiceClassA2-D	perfPol01wA	ServiceClassA2-D	0.00	Unkn

Hub Time: Fri, 11/18/2011 04:22 PM | Server Available | PowerVM Virtual Server Details - IBM-0X6CTF15S7A - SYSADMIN *ADMIN MODE*

CPU delay of 20% means 20% of time work had to wait

Workload Resource Groups using this server

Tivoli System Automation can ensure availability of Workload Resource Groups and Business Services

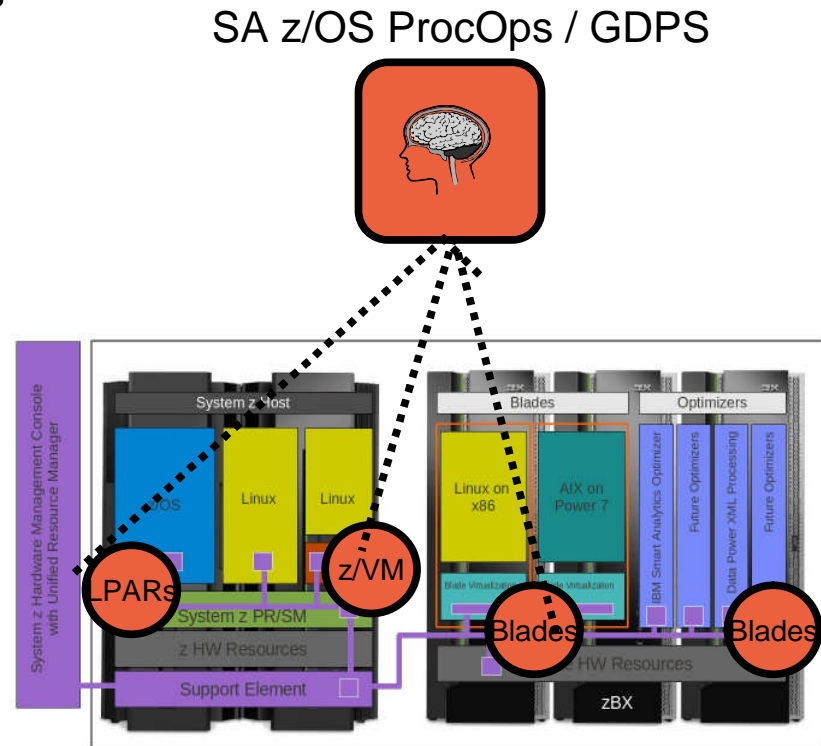




Basic Availability and DR with System Automation 3.4

Enhanced hardware automation capabilities

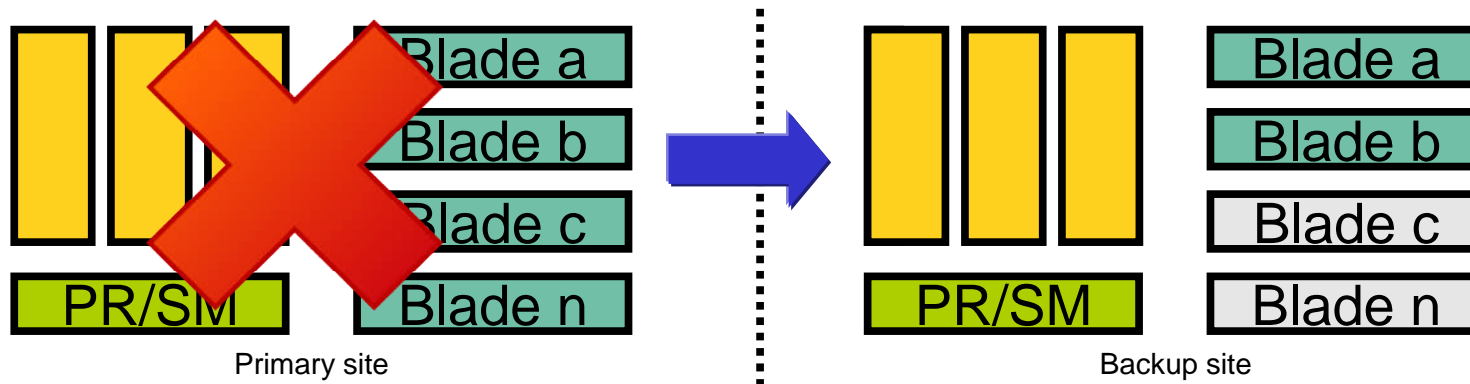
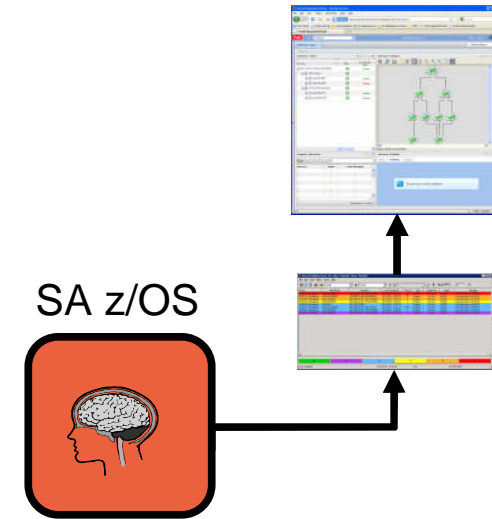
- SA z/OS Processor Operations is used already today to automate hardware operations in System z environments
- SA is enhanced to
 - be aware of zBX, blades, virtual servers and their workload context
 - be informed about inventory and status changes
 - include new elements in policy
 - permitting similar commands as possible for CPC today also for zBX elements
- Value
 - Reduced operations costs due to SPOC for zEnterprise automated HW operations
 - Simplified site management for planned and unplanned outages
 - Immediate alerting based on policy in case of failures
 - Foundation for GDPS Application CA/DR solution





Enhanced hardware automation capabilities - sample scenarios

- **Blade reports hardware message**
 - SA z/OS ProcOps is informed and alert is sent to OMNIBus
 - Alert will be rendered on TBSMs business service dashboard
 - ✓ LOB is immediately informed about potential failure
- **Shutdown of complete node due to maintenance**
 - SA z/OS ProcOps deactivates all blades
 - SA z/OS ProcOps deactivates all LPARs
 - SA z/OS ProcOps powers off CPC and zBX
 - ✓ Fully automated hardware operations enables quick shutdown and startup and reduces overall maintenance window
- **Site takeover directed by GDPS**
 - SA z/OS ProcOps activates idle resources on backup server

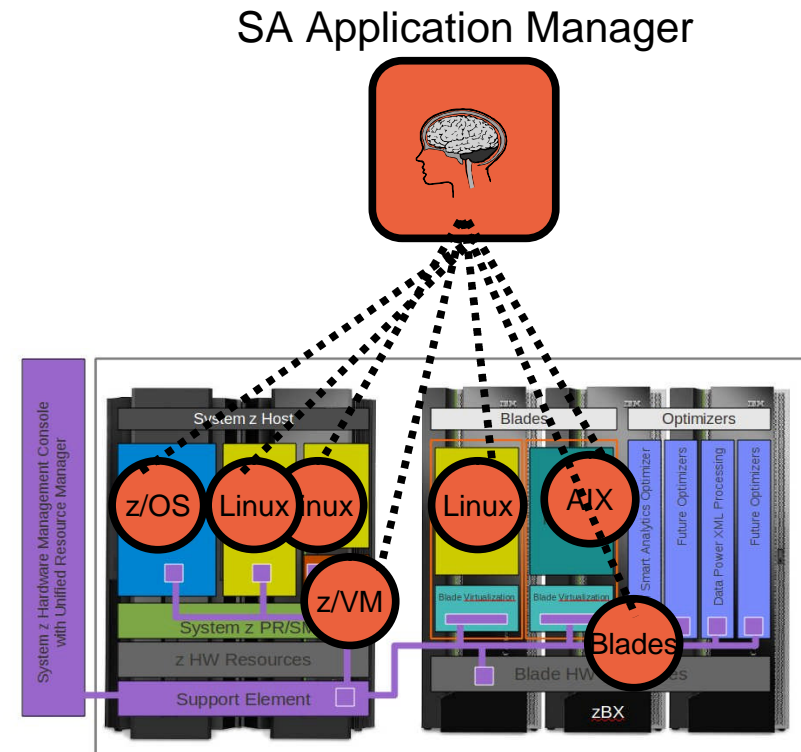




Basic Availability and DR with SA Application Manager 3.4 GA

Virtualization capabilities

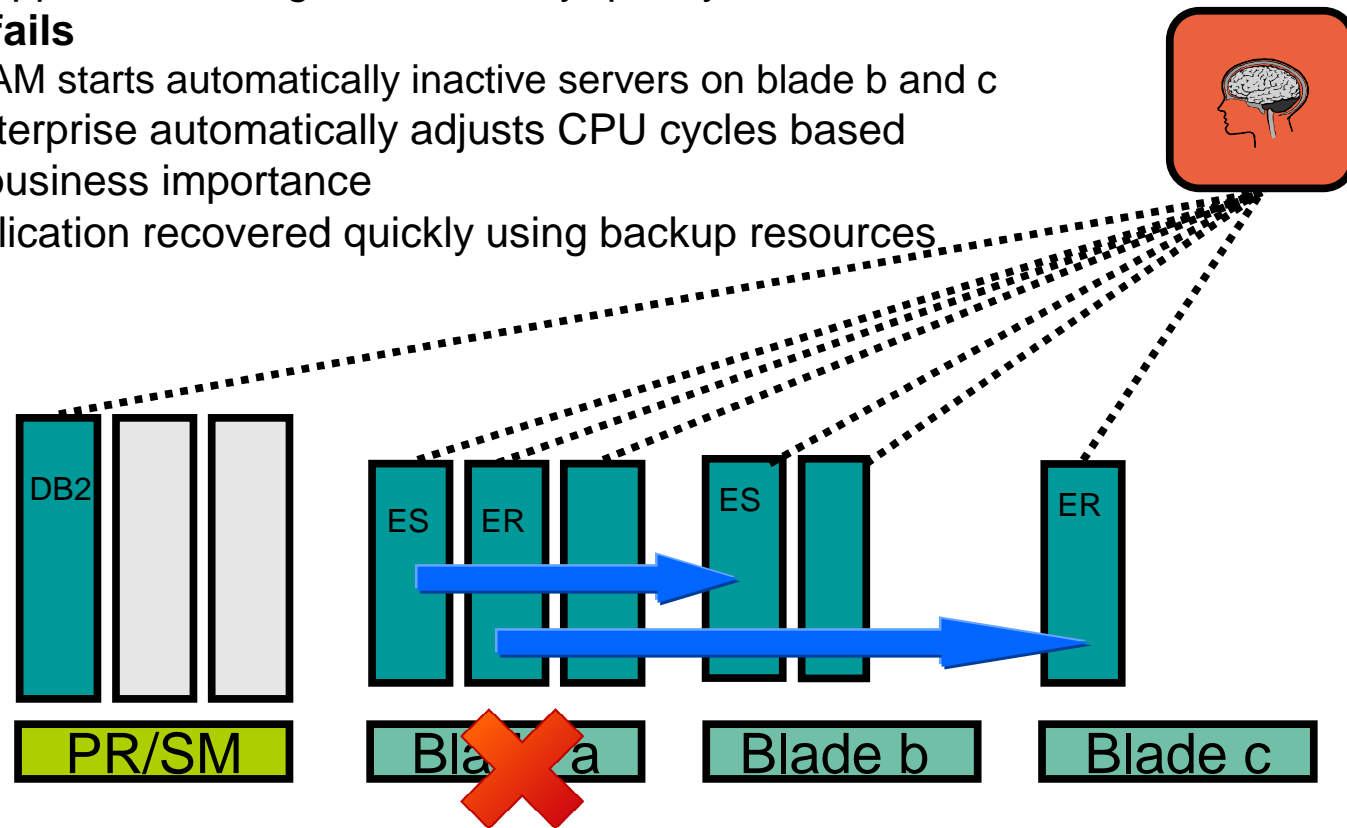
- SA Application Manager manages multi-tier applications across platforms and is IBM's implementation for GDPS Distributed Cluster Management (DCM)
- It is enhanced to
 - be aware of zBX virtualization infrastructure, the virtual servers and their workload context
 - be informed about virtual server inventory and status changes
 - permitting virtual server operations (start/stop)
 - permitting toggle from primary site to backup site as directed by GDPS
 - Metro distance
 - Unlimited distance
- Value
 - Reduced operations cost due to SPOC for operating business applications on virtualized infrastructure
 - Avoids or reduces MTTR in case of application or infrastructure outages
 - Unique zEnterprise DR solution that completes GDPS Application CA/DR solution for zEnterprise





Virtualization capabilities - sample scenarios

- **SAP Enqueue Replication Server (ER) fails**
 - SA MP moves ER server to active backup server
 - SA AM restarts failed server to become new backup
 - ✓ No application outage, redundancy quickly re-established
- **Blade a fails**
 - SA AM starts automatically inactive servers on blade b and c
 - zEnterprise automatically adjusts CPU cycles based on business importance
 - ✓ Application recovered quickly using backup resources





Summary

Tivoli provides **Visibility, **Control** and **Automation** for zEnterprise environments:**

- Availability and performance monitoring
- Capacity and performance planning
- End-to-end automated operations and high availability across platforms
- Enablement for configuration management, service delivery and impact analysis
- Time to Value and reduced Total Cost of Ownership



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